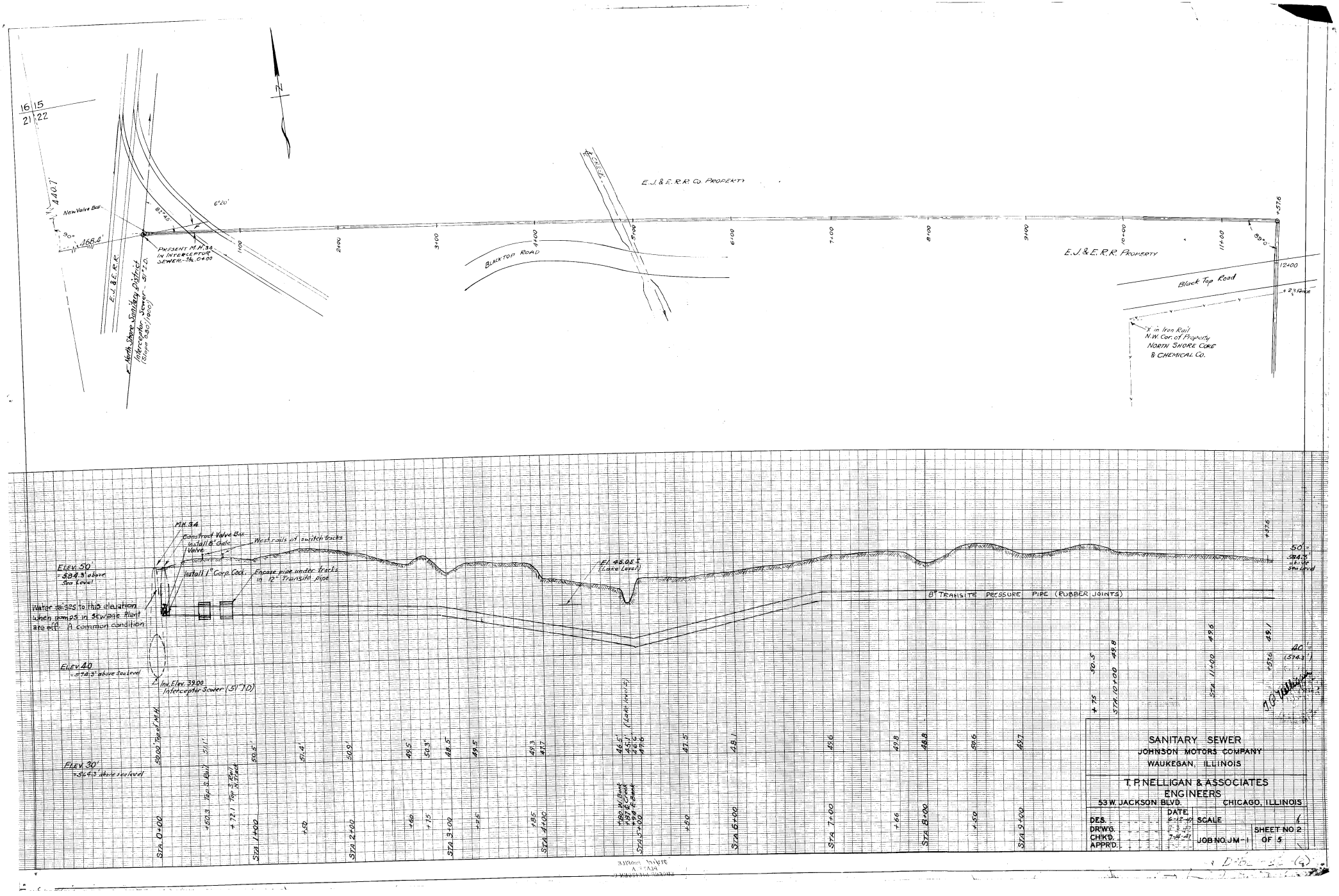

16 15
21 22
N
New Valve Box
440.1'
90°
168.4'
6°20'
82.45'
PRESENT M.H. 34 IN INTERCEPTOR SEWER - Sta. 0+00
North Shore Sanitary District Interceptor Sewer - 51" I.D. (Slope 0.80'/100')
E.J. & E. R.R.
E.J. & E.R.R. Co. PROPERTY
BLACK TOP ROAD
E.J. & E.R.R. Property
Black Top Road
+23 Fence
X in Iron Rail N.W. Cor. of Property NORTH SHORE COKE & CHEMICAL CO.
89°0'
1+00
2+00
3+00
4+00
5+00
6+00
7+00
8+00
9+00
10+00
11+00
12+00
+576
M.H. 34
Concrete Valve Box
Install 8" Gate Valve
West rails of switch tracks
Install 1" Corp. Cock.
Encase pipe under tracks in 12" Transite pipe
El. 45.0± (Lake Level)
8" TRANSITE PRESSURE PIPE (RUBBER JOINTS)
ELEV. 50
-584.3' above Sea Level
Water raises to this elevation when pumps in Sewage Plant are off. A common condition.
ELEV. 40
-574.3' above Sea Level
Inv. Elev. 39.00 Interceptor Sewer (51" I.D.)
ELEV. 30'
-564.3' above sea level
50.0' Top of M.H.
Sta. 0+00
Sta. 1+00
Sta. 2+00
Sta. 3+00
Sta. 4+00
Sta. 5+00
Sta. 6+00
Sta. 7+00
Sta. 8+00
Sta. 9+00
Sta. 10+00
Sta. 11+00
+576
50'
584.3'
Sea Level
40'
(574.3')
SANITARY SEWER
JOHNSON MOTORS COMPANY
WAUKEGAN, ILLINOIS
T. P. NELLIGAN & ASSOCIATES
ENGINEERS
53 W. JACKSON BLVD. CHICAGO, ILLINOIS
DES.
DR'W'G.
CH'KD.
APPR'D.
DATE
6-12-47
7-28-47
SCALE 1
SHEET NO. 2
JOB NO. JM-1
OF 5

Appendix B
Record Drawings

WATER TREATMENT SYSTEM
OMC WAUKEGAN HARBOR

U.S. ENVIRONMENTAL PROTECTION AGENCY
WAUKEGAN, IL

PROJECT LOCATION

VICINITY MAP

N

PROJECT LOCATION

LOCATION MAP

N

INDEX TO DRAWINGS

GENERAL

SHEET NO.	DRAWING NO.	TITLE
.	G-1	TITLE SHEET, VICINITY AND LOCATION MAPS, AND INDEX TO DRAWINGS
	G-2	ABBREVIATIONS, DESIGNATION AND FLOW STREAMS LEGENDS
	G-3	CIVIL LEGEND
	G-4	INSTRUMENTATION AND CONTROL LEGEND

CIVIL

SHEET NO.	DRAWING NO.	TITLE
.	C-1	EXISTING SITE PLAN
	C-2	SITE DEVELOPMENT PLAN AND PARTIAL SERVICE ONE LINE DIAGRAM
	C-3	ENLARGED SITE PLAN AT NEW WATER TREATMENT BUILDING
	C-4	CROSS-SECTIONS AND COLLECTION RISER DETAILS

INSTRUMENTATION AND CONTROL

.	N-1	WATER TREATMENT SYSTEM P&ID

ARCHITECTURAL/ STRUCTURAL

.	AS-1	WATER TREATMENT SYSTEM BUILDING PLAN AND SECTION

PROCESS MECHANICAL

.	D-1	WATER TREATMENT SYSTEM BUILDING PLAN AND SECTION

NO.	DATE	REVISION	BY	APVD
DSGN	DA KIERZEK	DR DA KIERZEK	CHK EA McKENNA	APVD EA McKENNA

WATER TREATMENT SYSTEM
OMC WAUKEGAN HARBOR
U.S. ENVIRONMENTAL PROTECTION AGENCY
WAUKEGAN, ILLINOIS

CH2MHILL®

GENERAL
TITLE SHEET,
VICINITY AND LOCATION MAPS,
AND INDEX TO DRAWINGS

NO SCALE
VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE	FEBRUARY 2014
PROJ	424337
DWG	G-1
SHEET	of

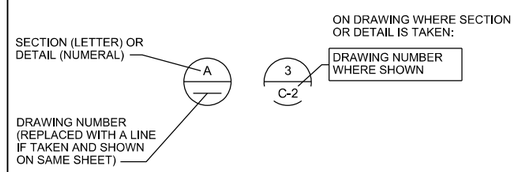
BID DOCUMENTS

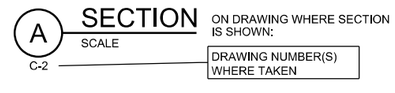
FILENAME: 01-G-001_424337.dgn PLOT DATE: 2/25/2014 PLOT TIME: 1:50:33 PM

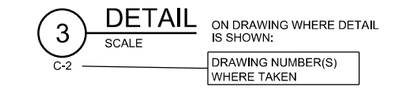
ABBREVIATIONS

@	AT
AB	ANCHOR BOLT
ABDN	ABANDONED
A/C	AIR CONDITIONER
ACBD	ACOUSTICAL BOARD
ACCU	AIR-COOLED CONDENSING UNIT
ACST	ACOUSTICAL TILE
ACT	ACOUSTICAL
ACU	AIR CONDITIONING UNIT
AD	AREA DRAIN
ADDL	ADDITIONAL
ADJ	ADJACENT
AFD	ADJUSTABLE FREQUENCY DRIVE
AHR	ANCHOR
AHU	AIR HANDLING UNIT
AL	ALUMINUM
ALTN	ALTERNATE
ANOD	ANODIZED
APPROX	APPROXIMATE
APVD	APPROVED
ARCH	ARCHITECTURAL
ARD	ACID RESISTANT DRAIN
ASSY	ASSEMBLY
ASU	AIR SUPPLY UNIT
AVG	AVERAGE
BC	BOOSTER HEATING COIL
BETW	BETWEEN
BF	BOTTOM FACE
BG	LOW WALL GRILLE
BLDG	BUILDING
BM	BEAM
BOD	BOTTOM OF DUCT
BOD $_5$	BIOCHEMICAL OXYGEN DEMAND (5 DAY TEST)
BOT	BOTTOM
BRG	BEARING
CAB.	CABINET
C/C	CHLORINE CONTACT
CD	CEILING DIFFUSER
CEM PLAS	CEMENT PLASTER
CF	CEILING FAN
CG	CEILING GRILLE
CHEM	CHEMICAL
CHKD	CHECKERED
CFM	CUBIC FEET PER MINUTE
CJ	CONSTRUCTION JOINT
CI	CAST IRON
CISP	CAST IRON SOIL PIPE
CL	CENTER LINE
CL $_2$	CHLORINE
CLDI	CEMENT LINED DUCTILE IRON
CLG	CEILING
CLP	CLAY PIPE
CLR	CLEAR
CMP	CORRUGATED METAL PIPE
CMU	CONCRETE MASONRY UNITS
COL	COLUMN
CONC	CONCRETE
CONN	CONNECTION
CONST	CONSTRUCTION
CONT	CONTINUOUS
COR	CORNER
CP	CONCRETE PIPE
CPLG	COUPLING
CPU	CENTRAL PROCESSING UNIT
CPVC	CHLORINATED POLYVINYL CHLORIDE
CR	CEILING REGISTER
C TO C	CENTER TO CENTER
CTR	CENTER
CTRD	CENTERED
CU FT	CUBIC FEET
C/W	COMPLETE WITH
△	CENTRAL ANGLE
DAF	DISSOLVED AIR FLOTATION
DBA	DEFORMED BAR ANCHOR
DBL	DOUBLE
DECHLOR	DECHLORINATION
DEG °	DEGREE
DET	DETAIL
DG	DOOR GRILLE
DIA	DIAMETER
DIAG	DIAGONAL
DIM	DIMENSION
DIP	DUCTILE IRON PIPE
DIR	DIRECTION
DISCH	DISCHARGE
DS	DOWNSPOUT
DN	DOWN
DP	DATA PORT
DPM	DIGITAL POWER METER
DRWR	DRAWER
DWG	DRAWING
DWL	DOWEL
E	EAST
E	EXTERNAL
EA	EACH
ELB	ELBOW
EC	ELECTRIC CONVECTOR
ECC	ECCENTRIC
EDH	ELECTRIC DUCT HEATER
EF	EACH FACE OR EXHAUST FAN
EFL	EFFLUENT
EL	ELEVATION
ELEC	ELECTRICAL
ENS	ETHERNET SWITCH
EQL	EQUAL
EQL SP	EQUALLY SPACED
EQPT	EQUIPMENT
EW	EACH WAY
EXA	EXHAUST AIR
EXP JT	EXPANSION JOINT
EXT	EXTERIOR
EXST	EXISTING
FAB	FABRICATION
F FL EL	FINISHED FLOOR ELEVATION
FACIL	FACILITY
FC	FLEXIBLE CONNECTION
FCA	FLANGED COUPLING ADAPTER
FCTY, FACT.	FACTORY
F.EXT	FIRE EXTINGUISHER
FD	FLOOR DRAIN OR FIRE DAMPER
FDN	FOUNDATION
FLEX	FLEXIBLE
FLG	FLANGE
FLR	FLOOR
FNSH	FINISH
FRP	FIBERGLASS REINFORCED PLASTIC
FT	FEET
FTC	FIN TUBE CONVECTOR
G	GAS
GA	GAUGE
GAC	GRANULAR ACTIVATED CARBON
GB	GRAB BAR
GBD	GRAVITY BACKDRAFT DAMPER
GAL	GALLON
GALV	GALVANIZED
GALVS	GALVANIZED STEEL
GCL	GEOSYNTHETIC CLAY LINER
GIV	GRAVITY INTAKE VENTILATOR
GPD	GALLONS PER DAY
GRV	GRAVITY RELIEF VENTILATOR
GUH	GAS UNIT HEATER
GVL	GRAVEL
GWB	GYPSUM WALLBOARD
GYP PLAS	GYPSUM PLASTER
H.A.S	HEADED ANCHOR STUD
HCR	HIGH CAPACITY REGISTER
HD	HUB DRAIN
HDNR	HARDENER
HDR	HEADER
HGT	HEIGHT
HPT	HIGH POINT ELEVATION
HORIZ	HORIZONTAL
HM	HOLLOW METAL
HR	HOUR
HTR	HIGH THROW REGISTER
HV	HOSE VALVE
I&C	INSTRUMENTATION AND CONTROL
ID	INSIDE DIAMETER
IF	INSIDE FACE
INFL	INFLUENT
INSTL	INSTALL
INSUL	INSULATION
INVT	INVERT
I/O	INPUTS AND OUTPUTS
ISP	INTERNET SERVICE PROVIDER
ITG	INSULATED TEMPERED GLASS
JT	JOINT
L	LENGTH OF CURVE
LB	POUNDS
LB/D	POUNDS PER DAY
LCP	LOCAL CONTROL PANEL
LF	LINIER FEET
LG	LONG
LLV	LONG LEG VERTICAL
LNTL	LINTEL
LONG	LONGITUDINAL
LPT	LOW POINT ELEVATION
LR	LONG RADIUS
LT	LIGHT
MATL	MATERIAL
MAU	MAKE UP AIR UNIT
MAX	MAXIMUM
MB	MACHINE BOLT
MCC	MOTOR CONTROL CENTER
MD	MOTORIZED DAMPER
MECH	MECHANICAL
MFR	MANUFACTURER
MGD	MILLION GALLONS PER DAY
MG/L	MILLIGRAMS PER LITER
MH	MANHOLE
MIN	MINIMUM
MIR	MIRROR
MISC	MISCELLANEOUS
MJ	MECHANICAL JOINT
MO	MASONRY OPENING
MON	MONUMENT
MTG	MOUNTING
MTL	METAL
MTRG	METERING
M&BH	MOP AND BROOM HOLDER
N	NORTH
NIC	NOT IN CONTRACT
NO.	NUMBER
NOM	NOMINAL
NORM	NORMAL
NTS	NOT TO SCALE
OA	OUTSIDE AIR
OC	ON CENTER
OD	OUTSIDE DIAMETER OR OVERFLOW DRAIN
OF	OUTSIDE FACE
O/H	OVERHEAD
OIU	OPERATOR INTERFACE UNIT
O TO O	OUT TO OUT
OPNG	OPENING
OPP	OPPOSITE
PC	POINT OF CURVATURE
PE	PLAIN END
PI	POINT OF INTERSECTION
P&ID	PROCESS AND INSTRUMENTATION DIAGRAM
PJF	PREMOLDED JOINT FILLER
PL	PLATE
PLAM	PLASTIC LAMINATE
PLC	PROGRAMMABLE LOGIC CONTROLLER
PLYWD	PLYWOOD
POC	POINT ON CURVE
POT	POINT ON TANGENT
PR	PAIR
PRCST	PRECAST
PS	POWER SUPPLY
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PT	POINT OF TANGENCY
PTD	PAPER TOWEL DISPENSER
PTD/R	PAPER TOWEL DISPENSER/RECEPTACLE
PVC	POINT OF VERTICAL CURVATURE OR POLYVINYL CHLORIDE
PVI	POINT OF VERTICAL INTERSECTION
PVMT	PAVEMENT
PVT	POINT OF VERTICAL TANGENCY
QDRNT	QUADRANT
R OR RAD	RADIUS OR RISER
RC	REINFORCED CONCRETE
RCP	REINFORCED CONCRETE PIPE
RD	ROOF DRAIN
RDCR	REDUCER
RDVF	ROTATING DRUM VACUUM FILTER
REHAB	REHABILITATION/REHABILITATED
REINF	REINFORCE
REQD	REQUIRED
RESIL	RESILIENT
RIO	REMOTE I/O
RM	ROOM
RO	ROUGH OPENING
RR	REDUCER
RST	REINFORCING STEEL
S	SOUTH
SA	SUPPLY AIR
SAT	SUSPENDED ACOUSTICAL TILE
SCHED	SCHEDULE
SD	SOAP DISPENSER OR SLOT DIFFUSER
SECT	SECTION
SG	SAFETY GLASS
SH	SHEET
SHTG	SHEETING
SIM	SIMILAR
SLV	SHORT LEG VERTICAL
S.O.	SHUTOFF
SPECD	SPECIFIED
SPECS	SPECIFICATIONS
SPG	SPACING
SQ	SQUARE
SST	STAINLESS STEEL
SS1	SURGE SUPPRESSOR, 120VAC
SS2	SURGE SUPPRESSOR , 24VDC
STA	STATION
STD	STANDARD
STIF	STIFFENER
STOR	STORAGE
STR	STRAIGHT
STRUCT	STRUCTURAL
STL	STEEL
SYMM	SYMMETRICAL
T	TREAD OR TANGENT LENGTH
TAR	TRANSFER AIR REGISTER
T&B	TOP AND BOTTOM
TC	TOP OF CONCRETE
TCU	TERMINAL CONTROL UNIT
TEMP	TEMPERED
TF	TOP FACE
TG	TEMPERED GLASS
THK	THICK
THRD	THREADED
T.O.	TOP OF
TPD	TONS PER DAY OR TOILET PAPER DISPENSER
TPI	TURNOUT POINT OF INTERSECTION
TRANSV	TRANSVERSE
TSS	TOTAL SUSPENDED SOLIDS
TST	TOP OF STEEL
TTD	TOILET TISSUE DISPENSER
TW	TOP OF WALL
TYP	TYPICAL
UH	UNIT HEATER
UON	UNLESS OTHERWISE NOTED
UPS	UNINTERRUPTABLE POWER SUPPLY
V	VENT
VAT	VINYL ASBESTOS TILE
VERT	VERTICAL
VCP	VITRIFIED CLAY PIPE
VD	VOLUME DAMPER
VFD	VARIABLE FREQUENCY DRIVE
VTR	VENT THRU ROOF
VWC	VINYL WALL COVERING
W	WEST
W/	WITH
WD	WOOD
WG	WIRE GLASS
WH	WATER HEATER
WK	WEEK
WRB	WATER RESISTANT GYPSUM WALLBOARD
WR	WASTE RECEPTACLE
WS	WATER STOP OR WATER SURFACE OR WELDED STEEL
WSG	WALL SUPPLY GRILLE
WSR	WALL SUPPLY REGISTER
WWM	WELDED WIRE MESH
XFMR	TRANSFORMER
YR	YEAR

SECTION / DETAIL DESIGNATIONS

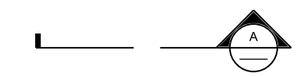




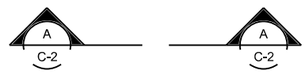


DRAWING TITLE
SCALE

ON DRAWING WHERE ONLY A TITLE IS REQUIRED WITH NO REFERENCE (eg: ELEVATIONS)



SECTION CALLOUT WHERE SECTION IS SHOWN ON THE SAME SHEET AND CUT EXTENDS TO A FIXED LIMIT



SECTION CALLOUT WHERE SECTION IS SHOWN ON ANOTHER SHEET AND CUT EXTENDS THROUGHOUT ENTIRE SHEET

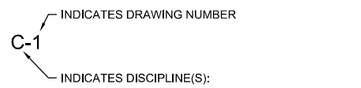
GRID LINE INDICATOR

KEYNOTE NUMBER

REVISION / ADDENDA NUMBER

NORTH ARROW

DRAWING NUMBER DESIGNATION



AS	ARCHITECTURAL/ STRUCTURALGENERAL
C	CIVIL
D	PROCESS MECHANICAL
G	GENERAL
N	INSTRUMENTATION AND CONTROL

DESIGN DETAIL DESIGNATION

NOTES:

1. THE TERM STANDARD DETAIL, OR A FORM OF IT, IS SYNOMONOUS WITH DESIGN DETAIL AND REFERS TO THE DESIGN DETAILS FOUND IN THIS SET OF CONTRACT DOCUMENTS.
2. THE DESIGN DETAILS REPRESENT THE CHARACTER AND NATURE OF THE WORK REQUIRED THROUGHOUT THE PROJECT. ALL ASSOCIATED WORK SHALL BE IN ACCORDANCE WITH THE DESIGN DETAILS SHOWN WHETHER THE DETAILS ARE SPECIFICALLY REFERENCED OR NOT.

FLOW STREAMS

BWR	BACKWASH RETURN
BWS	BACKWASH SUPPLY
CFW	CF WATER
EWW	EXTRACTION WELL WATER
IW	INFLUENT WATER
SD	SUMP DISCHARGE
TE	TREATED EFFLUENT
W1	POTABLE WATER SOURCE
ALP	AIR, LOW PRESSURE PROCESS
D	DRAIN

GENERAL NOTE

1. THIS IS A STANDARD LEGEND SHEET. SOME ABBREVIATIONS MAY APPEAR ON THIS SHEET AND NOT ON THE PLANS.

NO.	DATE	DSGN	DR	CHK	APVD	BY	REVISION
	DA KIERZEK	DA KIERZEK	DA KIERZEK	EA McKENNA	EA McKENNA		

WATER TREATMENT SYSTEM
OMC WAUKEGAN HARBOR
U.S. ENVIRONMENTAL PROTECTION AGENCY
WAUKEGAN, ILLINOIS

CH2MHILL®

GENERAL

ABBREVIATIONS, DESIGNATION AND FLOW STREAMS LEGEND

NO SCALE
VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING. 0 1"

DATE	FEBRUARY 2014
PROJ	424337
DWG	G-2
SHEET	of

BID DOCUMENTS

FILENAME: 01-G-002_424337.dgn PLOT DATE: 2/25/2014 PLOT TIME: 1:50:34 PM

GENERAL SITE NOTES:

1. EXISTING CONDITIONS MAY VARY FROM THOSE SHOWN ON THESE PLANS. THE SUB-CONTRACTOR SHALL VERIFY EXISTING CONDITIONS AND ADJUST WORK PLAN ACCORDINGLY PRIOR TO BEGINNING CONSTRUCTION.
2. EXISTING TOPOGRAPHY, STRUCTURES, AND SITE FEATURES ARE SHOWN SCREENED AND/OR LIGHT-LINED. NEW FINISH GRADE, STRUCTURES, AND SITE FEATURES ARE SHOWN HEAVY-LINED UNLESS OTHERWISE INDICATED.
3. HORIZONTAL DATUM: NAD 83 STATE PLANE ILLINOIS EAST FIPS 1201 FEET.
4. VERTICAL DATUM: NAVD 88
5. MAINTAIN, RELOCATE, OR REPLACE EXISTING SURVEY MONUMENTS, CONTROL POINTS, AND STAKES WHICH ARE DISTURBED OR DESTROYED. PERFORM THE WORK TO PRODUCE THE SAME LEVEL OF ACCURACY AS THE ORIGINAL MONUMENT(S) IN A TIMELY MANNER, AND AT THE CONTRACTOR'S EXPENSE.
6. PROVIDE TEMPORARY FENCING AS NECESSARY TO MAINTAIN SECURITY AT ALL TIMES.
7. ELEVATIONS GIVEN ARE TO FINISH GRADE UNLESS OTHERWISE SHOWN.
8. SLOPE UNIFORMLY BETWEEN CONTOURS AND SPOT ELEVATIONS SHOWN.
9. TAKE ALL OTHER MEASURES TO POSITIVELY PRECLUDE EROSION MATERIALS FROM LEAVING THE SITE.

GENERAL YARD PIPING AND UTILITIES NOTES:

1. EXISTING UNDERGROUND UTILITIES OBTAINED FROM AS-BUILTS AND FROM FIELD SURVEY. CONTRACTOR SHALL FIELD VERIFY DEPTH AND LOCATION PRIOR TO EXCAVATION. PROTECT ALL EXISTING UTILITIES DURING CONSTRUCTION.
2. EXISTING PIPING AND EQUIPMENT ARE SHOWN SCREENED AND/OR LIGHT-LINED. NEW PIPING AND EQUIPMENT ARE SHOWN HEAVY-LINED UNLESS OTHERWISE INDICATED.

CIVIL LEGEND

EXISTING	THIS CONTRACT	
× 157.7	⊗ 158.5	SPOT ELEVATION
155	155	CONTOUR LINE
	3:1	EMBANKMENT AND SLOPE
		DRAINAGEWAY OR DITCH
	CB OR CB	CATCH BASIN OR INLET
		TRENCH DRAIN
	OR	SIGN
	Ⓓ OR Ⓢ	MANHOLE
E	E	ELECTRICAL MANHOLE
H	H	ELECTRIC HANDHOLE
		POST OR GUARD POST
		GUY ANCHOR
		FIRE HYDRANT
		UTILITY POLE
		LIGHT POLE
	BM	BENCH MARK
		SURVEY CONTROL POINT OR POINT OF INTERSECTION
		CAP
		CONNECTION POINT TO EQUIPMENT
		NONFUSED DISCONNECT SWITCH
T	T	TRANSFORMER
		BRUSH/TREE LINE
		TREE
		PROPERTY LINE
		CENTER LINE, BUILDING, ROAD, ETC.
		STAGING OR WORK AREA LIMITS
EL	EL	ELECTRICAL EASEMENT
E-OVH	E-OVH	ELECTRICAL OVERHEAD LINE
G	G	NATURAL GAS
S	S	SANITARY SEWER
SS	SS	STORM SEWER
SSFM	SSFM	SANITARY SEWER FORCE MAIN
W	W	WATER SUPPLY

CIVIL LEGEND - CONTINUED

EXISTING	THIS CONTRACT	
	N 1000.00 E 1000.00	STRUCTURE, BUILDING OR FACILITY LOCATION POINT - COORDINATES
		MONITORING OR EXTRACTION WELL
		DISCHARGE POINT
		CONTROL BUILDING
		LAKE LEVEL MONITORING STATION
OR	OR	DEMOLITION
OR	OR	STRUCTURE, BUILDING OR FACILITY
		GRAVEL SURFACING
		CONCRETE PAVEMENT
		SAND FILTER PACK
		BENTONITE FILL
		NATIVE SOIL BACKFILL
		PEASTONE
		CURB
		CURB AND GUTTER
		SINGLE SWING GATE
		DOUBLE SWING GATE
		SLIDING GATE
		CHAIN LINK FENCE
		CULVERT
		GUARD RAIL
		RAILROAD TRACKS
		SILT FENCE
		SLURRY WALL

GENERAL NOTE:

1. THIS IS A STANDARD LEGEND SHEET. THEREFORE, NOT ALL OF THE INFORMATION SHOWN MAY BE USED ON THIS PROJECT.

NO.	DATE	DR	CHK	APVD	BY	REVISION
DSGN	RD BLOCK	DA KIERZEK	EA McKENNA	APVD	EA McKENNA	

WATER TREATMENT SYSTEM
OMC WAUKEGAN HARBOR
U.S. ENVIRONMENTAL PROTECTION AGENCY
WAUKEGAN, ILLINOIS

CH2MHILL®

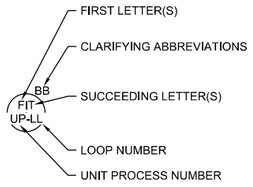
GENERAL
CIVIL LEGEND

NO SCALE
VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE	FEBRUARY 2014
PROJ	424337
DWG	G-3
SHEET	of

BID DOCUMENTS

INSTRUMENT IDENTIFICATION EXAMPLE SYMBOLS



DIGITAL SYSTEM INTERFACES

- ▲ ANALOG INPUT
- ▼ ANALOG OUTPUT
- △ DISCRETE INPUT
- ▽ DISCRETE OUTPUT

GENERAL INSTRUMENT OR FUNCTIONAL SYMBOLS

- FIELD MOUNTED INSTRUMENT
- REAR-OF-PANEL MOUNTED INSTRUMENT (OPERATOR INACCESSIBLE)
- PANEL MOUNTED INSTRUMENT
- MOTOR CONTROL CENTER MOUNTED INSTRUMENT
- COMPUTER FUNCTION
- PLC FUNCTION

TRANSDUCERS

A	ANALOG	I	CURRENT
D	DIGITAL	P	PNEUMATIC
E	VOLTAGE	PF	PULSE FREQUENCY
F	FREQUENCY	PD	PULSE DURATION
H	HYDRAULIC	R	RESISTANCE

EXAMPLE:

CURRENT TO PNEUMATIC TRANSDUCER (BACK OF

INSTRUMENT IDENTIFICATION LETTERS TABLE

LETTER	FIRST-LETTER: PROCESS OR INITIATING VARIABLE	FIRST-LETTER: MODIFIER	SUCCEEDING-LETTERS: READOUT OR PASSIVE FUNCTION	SUCCEEDING-LETTERS: OUTPUT FUNCTION	SUCCEEDING-LETTERS: MODIFIER
A	ANALYSIS (+)		ALARM		
B	BURNER, COMBUSTION		USER'S CHOICE (∗)	USER'S CHOICE (∗)	USER'S CHOICE (∗)
C	USER'S CHOICE (∗)			CONTROL	
D	DENSITY (S.G)	DIFFERENTIAL			
E	VOLTAGE		PRIMARY ELEMENT, SENSOR		
F	FLOW RATE	RATIO (FRACTION)			
G	USER'S CHOICE (∗)		GLASS, GAUGE VIEWING DEVICE	GATE	
H	HAND (MANUAL)				HIGH
I	CURRENT (ELECTRICAL)		INDICATE		
J	POWER	SCAN			
K	TIME, TIME SCHEDULE	TIME RATE OF CHANGE		CONTROL STATION	
L	LEVEL		LIGHT (PILOT)		LOW
M	MOTION	MOMENTARY			MIDDLE, INTERMEDIATE
N	TORQUE		USER'S CHOICE (∗)	USER'S CHOICE (∗)	USER'S CHOICE (∗)
O	USER'S CHOICE (∗)		ORIFICE, RESTRICTION		
P	PRESSURE, VACUUM		POINT (TEST) CONNECTION		
Q	QUANTITY	INTEGRATE, TOTALIZE			
R	RADIATION		RECORD OR PRINT		
S	SPEED, FREQUENCY	SAFETY		SWITCH	
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION	MULTIFUNCTION
V	VIBRATION, MECHANICAL ANALYSIS			VALVE, DAMPER, LOUVER	
W	WEIGHT, FORCE		WELL		
X	UNCLASSIFIED (+)	X AXIS	UNCLASSIFIED (+)	UNCLASSIFIED (+)	UNCLASSIFIED (+)
Y	EVENT, STATE OR PRESENCE	Y AXIS		RELAY, COMPUTE, CONVERT	
Z	POSITION	Z AXIS		DRIVE, ACTUATOR, UNCLASSIFIED FINAL CONTROL ELEMENT	

TABLE BASED ON THE INSTRUMENTATION, SYSTEMS, AND AUTOMATION SOCIETY (ISA) STANDARD.

(+) WHEN USED, EXPLANATION IS SHOWN ADJACENT TO INSTRUMENT SYMBOL. SEE ABBREVIATIONS AND LETTER SYMBOLS.

(∗) WHEN USED, DEFINE THE MEANING HERE FOR THE PROJECT

SPECIAL CASES

ON AND OFF EVENT LIGHTS

ON-OFF HAND SWITCH, MAINTAINED CONTACT SWITCH (CONTROLLED DEVICE WILL RESTART ON RETURN OF POWER AFTER POWER FAILURE).

STOP-START HAND SWITCH MOMENTARY CONTACT SWITCHES (CONTROLLED DEVICE WILL NOT RESTART ON RETURN OF POWER AFTER POWER FAILURE).

ACCESSORY DEVICES

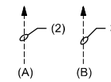
EXAMPLE: TRANSMITTER AS AN ACCESSORY TO A FLOW ELEMENT

A	=	ALARM
C	=	CONTROLLER
I	=	INDICATOR
R	=	RECORDER
S	=	SWITCH
T	=	TRANSMITTER

LINE LEGEND

- PROCESS (CLOSED CONDUIT, DASHED LINE INDICATES ALTERNATE FLOW STREAM)
- BUILDING OR FACILITY BOUNDARY
- PROCESS (OPEN CHANNEL)
- FO (xx/yy) — FIBER OPTIC CABLE xx = FIBERS USED yy= TOTAL FIBERS
- ANALOG SIGNAL (4 TO 20 mAdc, ETC.)
- DISCRETE SIGNAL (ON/OFF, ETC.)
- PNEUMATIC SIGNAL
- FILLED SYSTEM SIGNAL
- HYDRAULIC SYSTEM SIGNAL
- G — GENIBUS
- P — POWER
- MSC — MANUFACTURED SUPPLIED CABLE
- M — MODBUS
- E — ETHERNET, CAT 6 UTP
- CX — COAXIAL CABLE

PARALLELING LINES

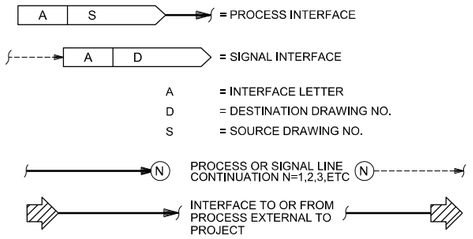


(A) TOTAL OF 2 SIGNALS

(B) 3 TYPICAL SETS OF 2 SIGNALS EACH, TOTAL OF 6 SIGNALS.

- CONNECTING LINES
- NON-CONNECTING LINES

INTERFACE SYMBOLS



VALVE SYMBOLS

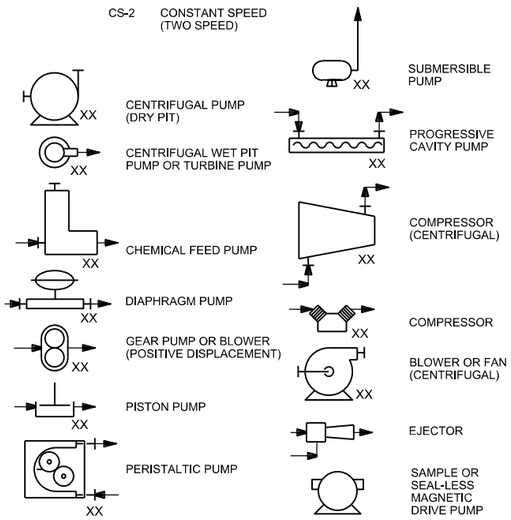
- BALL
- PRESSURE RELIEF
- SWING CHECK
- BALL CHECK
- BACKFLOW PREVENTER
- S — SAMPLE POINT

PUMP AND COMPRESSOR SYMBOLS

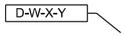
NOTE: XX = AS ADJUSTABLE SPEED

CS CONSTANT SPEED (SINGLE SPEED)

CS-2 CONSTANT SPEED (TWO SPEED)



SELF CONTAINED VALVE & EQUIPMENT TAG NUMBERS



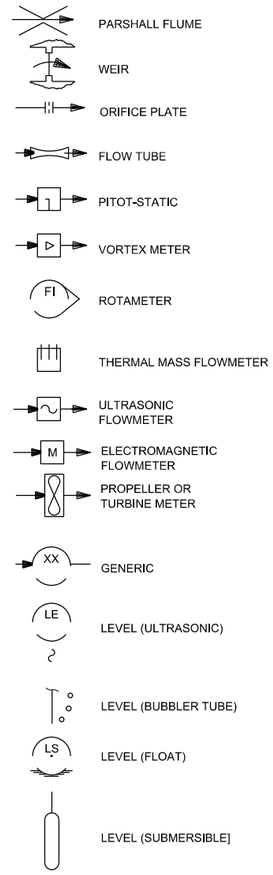
D:
- ARV = AIR RELEASE VALVE
- AVRV = AIR AND VACUUM RELEASE VALVE
- E = EJECTOR
- G = GATE
- M = MECHANICAL EQUIPMENT
- P = PUMP
- T = TANK

W = UNIT PROCESS NUMBER

X = LOOP NUMBER

Y = UNIT NUMBER

PRIMARY ELEMENT SYMBOLS



MISCELLANEOUS SYMBOLS

GENERAL NOTES

1. INSTRUMENTATION AND CONTROL COMPONENTS ARE PROVIDED AS PART OF THE TREATMENT SYSTEM PACKAGE. REFER TO SECTION 40 90 01, INSTRUMENTATION AND CONTROL FOR PROCESS SYSTEMS FOR ADDITIONAL REQUIREMENTS.
2. COMPONENTS AND PANELS SHOWN WITH A SINGLE ASTERISK (∗) ARE TO BE PROVIDED AS PART OF A PACKAGE SYSTEM.
3. THIS IS A STANDARD LEGEND. THEREFORE, NOT ALL OF THE INFORMATION MAY BE USED ON THIS PROJECT.

NO.	DATE	REVISION	BY	APVD
DSGN	DR LECKE	DR	DA KIERZEK	CHK
	DR LECKE			APVD
			EA McKENNA	

WATER TREATMENT SYSTEM
OMC WAUKEGAN HARBOR
U.S. ENVIRONMENTAL PROTECTION AGENCY
WAUKEGAN, ILLINOIS

CH2MHILL®

GENERAL

INSTRUMENTATION AND CONTROL LEGEND

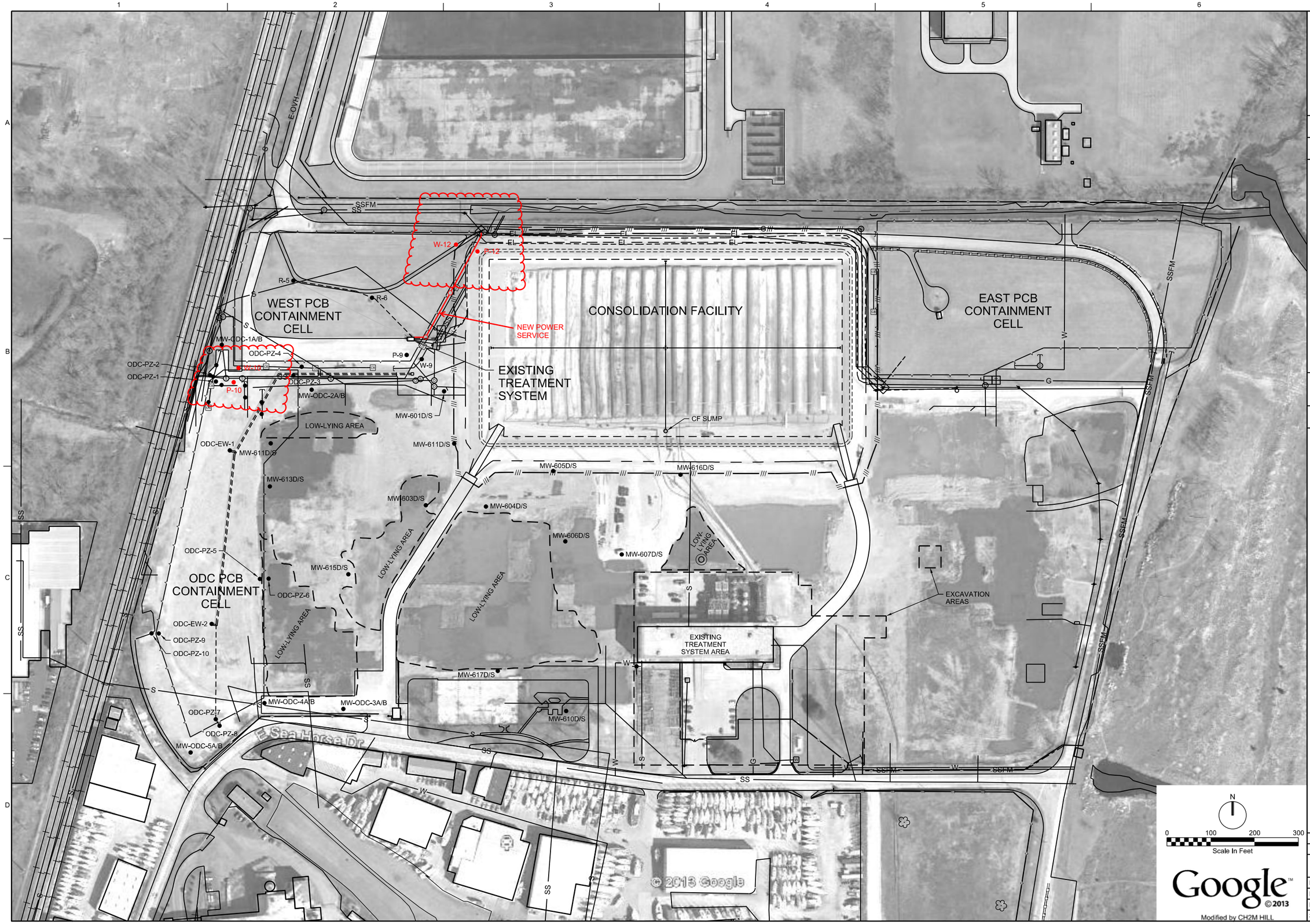
NO SCALE

VERIFY SCALE

BAR IS ONE INCH ON ORIGINAL DRAWING. 0 1"

DATE	FEBRUARY 2014
PROJ	424337
DWG	G-4
SHEET	of

BID DOCUMENTS



NO.	DATE	REVISION	BY	APVD
DSGN	EA McKENNA	DR DA KIERZEK	CHK EA McKENNA	APVD EA McKENNA

WATER TREATMENT SYSTEM
OMC WAUKEGAN HARBOR
U.S. ENVIRONMENTAL PROTECTION AGENCY
WAUKEGAN, ILLINOIS

CH2MHILL®

CIVIL

EXISTING SITE PLAN

	1"=100'
	VERIFY SCALE
	BAR IS ONE INCH ON ORIGINAL DRAWING. 0 1"
DATE	FEBRUARY 2014
PROJ	424337
DWG	C-1
SHEET	of

BID DOCUMENTS

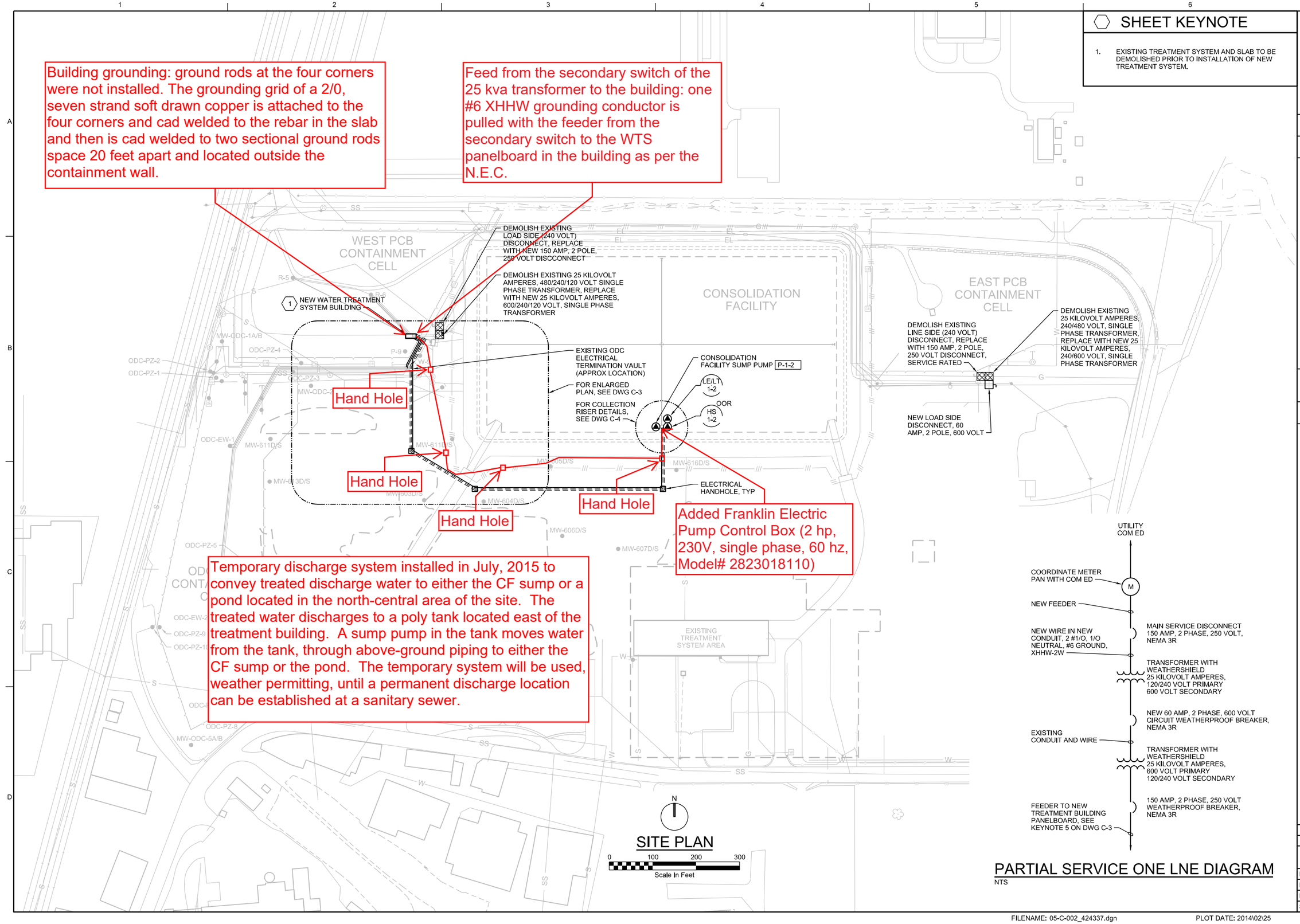
FILENAME: ANSI_D_424337_WTS.dgn PLOT DATE: 2/25/2014 PLOT TIME: 1:45:03 PM

Building grounding: ground rods at the four corners were not installed. The grounding grid of a 2/0, seven strand soft drawn copper is attached to the four corners and cad welded to the rebar in the slab and then is cad welded to two sectional ground rods space 20 feet apart and located outside the containment wall.

Feed from the secondary switch of the 25 kva transformer to the building: one #6 XHHW grounding conductor is pulled with the feeder from the secondary switch to the WTS panelboard in the building as per the N.E.C.

SHEET KEYNOTE

1. EXISTING TREATMENT SYSTEM AND SLAB TO BE DEMOLISHED PRIOR TO INSTALLATION OF NEW TREATMENT SYSTEM.



SITE PLAN

Temporary discharge system installed in July, 2015 to convey treated discharge water to either the CF sump or a pond located in the north-central area of the site. The treated water discharges to a poly tank located east of the treatment building. A sump pump in the tank moves water from the tank, through above-ground piping to either the CF sump or the pond. The temporary system will be used, weather permitting, until a permanent discharge location can be established at a sanitary sewer.

PARTIAL SERVICE ONE LNE DIAGRAM

NTS

NO.	DATE	REVISION	DR	CHK	APVD	BY	APVD
DSGN		RD BLOCK	DA KIERZEK	EA McKENNA	EA McKENNA		EA McKENNA

WATER TREATMENT SYSTEM
OMC WAUKEGAN HARBOR
U.S. ENVIRONMENTAL PROTECTION AGENCY
WAUKEGAN, ILLINOIS

CH2MHILL®

CIVIL

SITE DEVELOPMENT PLAN AND PARTIAL SERVICE ONE LINE DIAGRAM

BID DOCUMENTS

AS SHOWN	
VERIFY SCALE	
BAR IS ONE INCH ON ORIGINAL DRAWING. 0 1"	
DATE	FEBRUARY 2014
PROJ	424337
DWG	C-2
SHEET	of

FILENAME: 05-C-002_424337.dgn PLOT DATE: 2014\02\25 PLOT TIME: 4:12:05 PM

GENERAL NOTES

1. RESTORATION TO MATCH PRECONSTRUCTION CONDITIONS.
2. SOILS INSIDE WEST CONTAINMENT CELL ARE TSCA LEVEL PCB > 50 PPM.

SHEET KEYNOTES

1. REMOVE PIPE STUB AND VERTICAL PIPE SEGMENT UP TO 90 DEG ELBOW. CONNECT NEW HDPE SDR17 PIPE TO EXISTING PIPE. MATCH EXISTING PIPE INVERT ELEVATION. ROUTE NEW.
2. VERIFY PIPING AND CONDUIT ROUTE IN FIELD. PIPING AND CONDUIT ROUTE WILL ENCOUNTER VARIOUS INACTIVE UTILITIES AND MONITORING WELLS. IF ANY ACTIVE UTILITY ENCOUNTERED, IMMEDIATELY COORDINATE WITH THE CONTRACTOR.
3. PROTECT EXISTING TREATMENT SYSTEM EFFLUENT PIPING AND WEST PCB CONTAINMENT CELL INFLUENT PIPING.
4. PIPE AND CONDUIT INSTALLATION WILL INCLUDE WORK THROUGH THE EXISTING SLURRY WALL AND UNDER THE WEST PCB CONTAINMENT CELL LINER.
5. PROVIDE 2 #1/O, 1 #1/O NEUTRAL, AND 1 #6 GROUND XHHW-2 IN 3" PVC SCHEDULE 80 DIRECT BURIED CONDUIT.
6. SEPARATE SIGNAL CABLE AT LEAST 1'-0" FROM POWER CONDUCTORS.

WEST PCB CONTAINMENT CELL

EXISTING CONVEYANCE PIPING FROM RECOVERY WELL R-5

EXISTING CONVEYANCE PIPING FROM RECOVERY WELL R-6

EXISTING UNDERGROUND ELECTRIC

NEW 150A, 2 POLE, 250V DISCCONNECT

NEW 25KVA, 600/240/120V, SINGLE PHASE TRANSFORMER

NEW TREATMENT SYSTEM BUILDING

DISCHARGE TO NORTH DITCH

EXISTING SLURRY WALL

EXISTING SLURRY WALL

1 1/2" EWW-HDPE

1 1/2" EWW-HDPE

EXISTING ODC ELECTRICAL TERMINATION VAULT (APPROXIMATE LOCATION)

EXISTING CONTROL CABLE CONDUIT

EXISTING ELECTRICAL CONDUIT

ODC-PZ-4

ODC-PZ-3

MW-ODC-2A/B

P-9

W-9

MW-601D/S

LOW-LYING AREA

CONSOLIDATION FACILITY

DIRECT BURIED 2" PVC SCHEDULE 80 CONDUIT WITH 2 #1 & 1 #10 GROUND XHHW-2 TO NEW TREATMENT SYSTEM BUILDING

2" CFW-HDPE

6 DIRECT BURIED 2" PVC SCHEDULE 80 CONDUIT WITH 1- 2/C #16 TSP, 3 #14 XHHW & 1 #14 GROUND TO NEW TREATMENT SYSTEM BUILDING

ELECTRICAL HANDHOLE, TYP

LOW-LYING AREA

CONSTRUCTION ENTRANCE

MW-603D/S

N

0 20 40 60

Scale In Feet

NO.	DATE	REVISION	BY	APVD
DSGN	RD BLOCK	DR PA KARABAN	CHK EA McKENNA	APVD EA McKENNA

WATER TREATMENT SYSTEM
OMC WAUKEGAN HARBOR
U.S. ENVIRONMENTAL PROTECTION AGENCY
WAUKEGAN, ILLINOIS

CH2MHILL®

CIVIL

ENLARGED SITE PLAN AT NEW TREATMENT SYSTEM

1"=20'

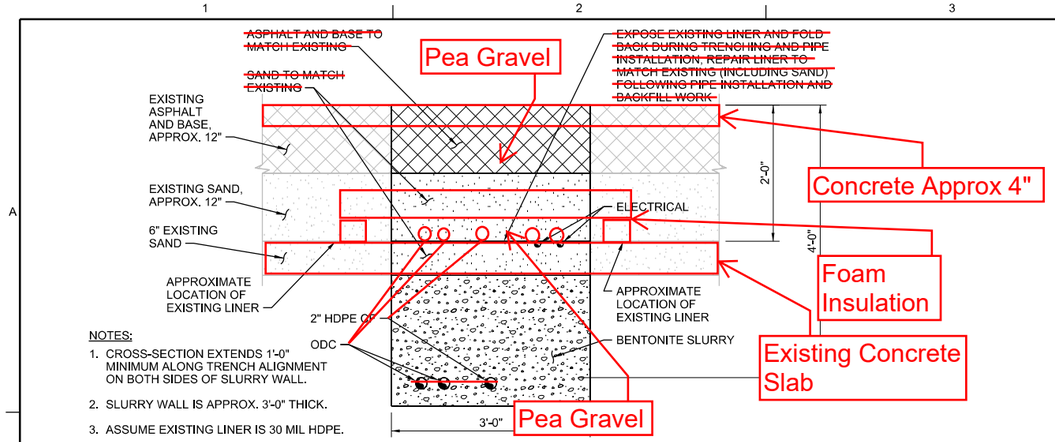
VERIFY SCALE

BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE	FEBRUARY 2014
PROJ	424337
DWG	C-3
SHEET	of

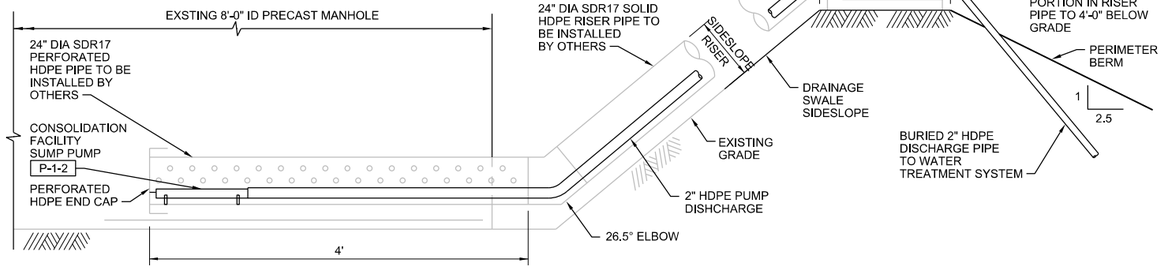
BID DOCUMENTS

FILENAME: 05-C-003_424337.dgn PLOT DATE: 2/25/2014 PLOT TIME: 1:44:50 PM



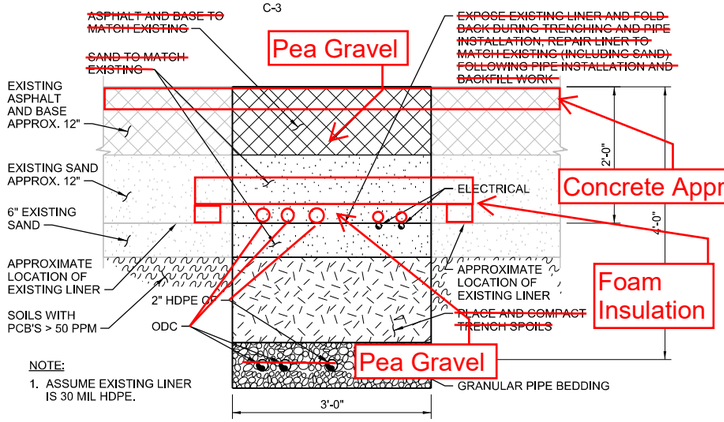
CROSS-SECTION PIPING THROUGH SLURRY WALL

A — NTS — C-3



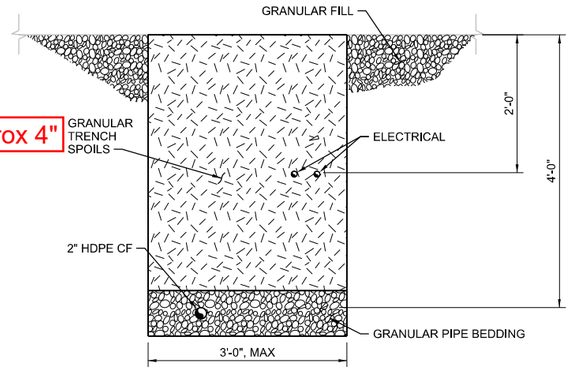
COLLECTION RISER

2 — NTS — C-2



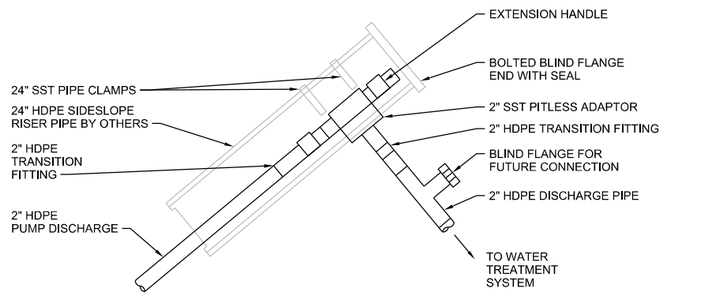
CROSS-SECTION PIPING INSIDE WEST CONTAINMENT CELL

B — NTS — C-3



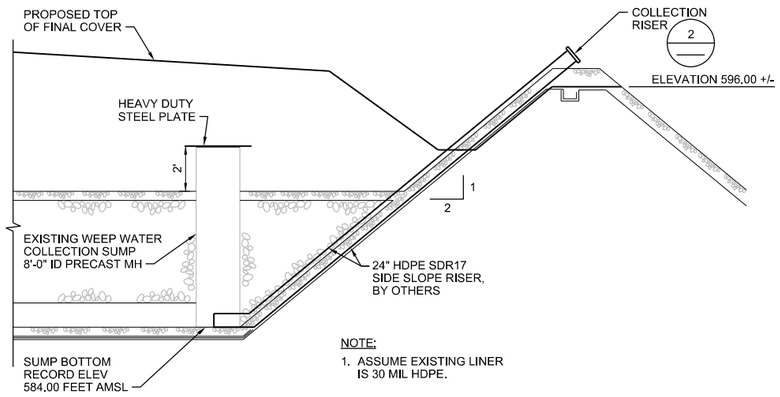
TYPICAL PIPE CROSS-SECTION OUTSIDE WEST CONTAINMENT CELL

C — NTS — C-3



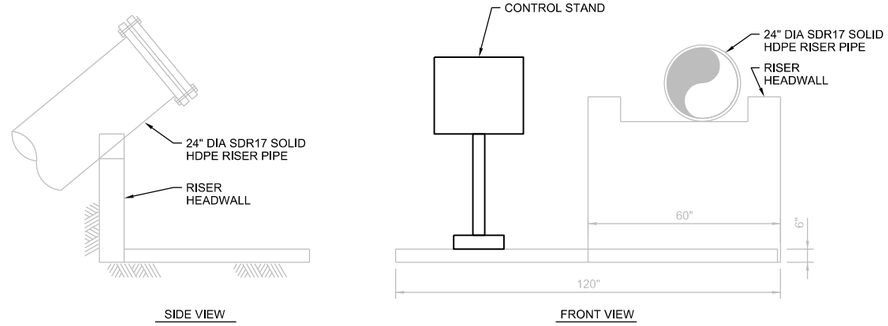
COLLECTION RISER DISCHARGE PIPING

3 — NTS — C-2



COLLECTION RISER AT CONSOLIDATION FACILITY PERIMETER BERM

1 — NTS — C-2



CONCRETE HEADWALL

4 — NTS — C-2

NO.	DATE	DR	REVISION	CHK	APVD
DSGN		RD BLOCK	PA KARABAN	EA McKENNA	EA McKENNA
				BY	APVD

AGENCY

WATER TREATMENT SYSTEM
OMC WAUKEGAN HARBOR
U.S. ENVIRONMENTAL PROTECTION AGENCY
WAUKEGAN, ILLINOIS

CH2MHILL®

CIVIL

CROSS-SECTIONS AND COLLECTION RISER DETAILS

NOT TO SCALE
VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING. 0 1"

DATE	FEBRUARY 2014
PROJ	424337
DWG	C-4
SHEET	of

BID DOCUMENTS

FILENAME: 05-C-004_424337.dgn PLOT DATE: 2/25/2014 PLOT TIME: 1:44:55 PM

CP-1

PLC-1
PROGRAMMABLE LOGIC CONTROLLER

LEVEL | LEVEL | RUN | LEVEL | ON | FAIL | RUN | REMOTE | ON | FAIL | RUN | SPEED FEEDBACK | SPEED COMMAND | FLOW | REMOTE | OPENED | CLOSED | REMOTE | POSITION FEEDBACK | POSITION COMMAND | TANK LEVEL | TANK LEVEL HIGH-HIGH | TANK LEVEL LOW-LOW | SPEED COMMAND | ON | RUN | REMOTE | ON | FAIL | RUN | REMOTE | ON | FAIL | RUN | DIFFERENTIAL PRESSURE | REMOTE | TANK LEVEL HIGH-HIGH | TREATMENT FACILITY STOP | TREATMENT FACILITY COMMON ALARM | DIFF. PRESSURE HIGH | DIFFERENTIAL PRESSURE | DIFFERENTIAL PRESSURE | TANK LEVEL HIGH-HIGH | TREATED EFFLUENT FLOW | ENTRY DOOR CLOSED | UPS ALARM | LOSS OF POWER

OIT-1 — ROUTER/ CELL MDM-1 MODEM

RADIO RAD-1-1 — LC 1-1-N (TYP OF 2)

SOLAR POWER — RADIO RAD-1-1-N

LS 1-1-N — HIGH, LOW, COM

LE/LT 1-1-N — LE/LT 1-1-N

P-1-1-1 — WEST PCB CONTAINMENT CELL EXTRACTION WELLS (R-5, R-6) (TYP OF 2) — 240V, 1-PH

AFD — 240V, 1-PH (TYP OF 2)

FIT 1-1 — FE 1-1 — 1 1/2"-EWW-PVC

ZSL 10-1 — BUILDING EXTERIOR

1"-V-PVC

2"-BWR-PVC

BACKWASH RETURN TO DISPOSAL TANK

FROM TEMP. STORAGE TANK

2"-CFW-HDPE — FIT 1-2 — FE 1-2 — 1 1/2"-CFW-PVC

HS 1-2-1 — 120V — OOR

FCV 1-2

LE/LT 1-2 — P-1-2 — CONSOLIDATION FACILITY (CF) SUMP — 240V, 1-PH

120V — LIT 2-1 — LE 2-1 — LSHH 2-1 — LSLL 2-1 — INFLUENT PUMP TANK T-2-1

2"-IW-PVC — PI 3-1-1 — PDIT 3-1 — PI 3-1-2 — CARTRIDGE FILTER M-3-1

INFLUENT PUMP P-2-1 — 240V, 1-PH

2"-IW-PVC — GAC 1 M-4-1 — GAC 2 M-4-2

PI 4-1-1 — PI 4-2-1 — PDIT 4-1 — PDIT 4-2 — PI 4-1-2 — PI 4-2-2

2"-TE-HDPE — TO INFILTR. WETLAND — TO CF SUMP

FIT 5-1 — FE 5-1 — 2"-TE-PVC

2"-IW-PVC — STATIC MIXER M-8-1 — AIR

LI 9-1 — LSHH 9-1 — DIFFUSED AERATION TANK T-9-1

PDSL 9-1 — ALP — AERATION BLOWER M-9-1 — 240V, 1-PH — CS

CHEMICAL FEED PUMP P-8-1 — AS — 120V

CHEMICAL DRUM T-8-1

2"-SD-PVC — SWITCHED 120V — LSHH 7-1 — LSH 7-1 — BUILDING SUMP P-7-1

1 1/2"-EWW-HDPE — FIT 1-3-N — FE 1-3-N — 1 1/2"-EWW-PVC (2)

LE/LT 1-3-N — P-1-3-1 — ODC PCB CONTAINMENT CELL EXTRACTION WELLS (ODC-EW-1, ODC-EW-2) (TYP OF 2) — 240V, 1-PH

BACKWASH SUPPLY FROM POTABLE SOURCE — W1 — 2"-BWS-PVC

EXTERIOR | BUILDING

LSHH 6-1 — LSH 6-1 — 120V — STORAGE TANK T-6-1 — P-6-1

GENERAL SHEET NOTE

1. INSTRUMENT IDENTIFICATION UNIT NUMBERS DESIGNATED WITH "N" SHALL BE REPLACED WITH 1 THROUGH 6.

SHEET KEYNOTES

1. FLOW METER MUST BE INSTALLED IN A TRAP OR WITH UPWARD FLOW SO FLOW ELEMENT IS ALWAYS FULL OF LIQUID, PER MANUFACTURER. FLOW METER MUST BE INSTALLED WITH SUFFICIENT STRAIGHT PIPE UPSTREAM AND DOWNSTREAM, PER MANUFACTURER.
2. HAND SWITCH LOCATED NEAR PUMP.
3. SUBMERSIBLE PUMP INCLUDES INTEGRAL FLOAT.
4. CONNECT WELLS TOGETHER WITH PVC TEE.

NO.	DATE	REVISION	DR	CHK	APVD
DSGN	WM ANDRAE	DA KIERZEK	EA McKENNA	EA McKENNA	BY APVD

CH2MHILL®

WATER TREATMENT SYSTEM
OMC WAUKEGAN HARBOR
U.S. ENVIRONMENTAL PROTECTION AGENCY
WAUKEGAN, ILLINOIS

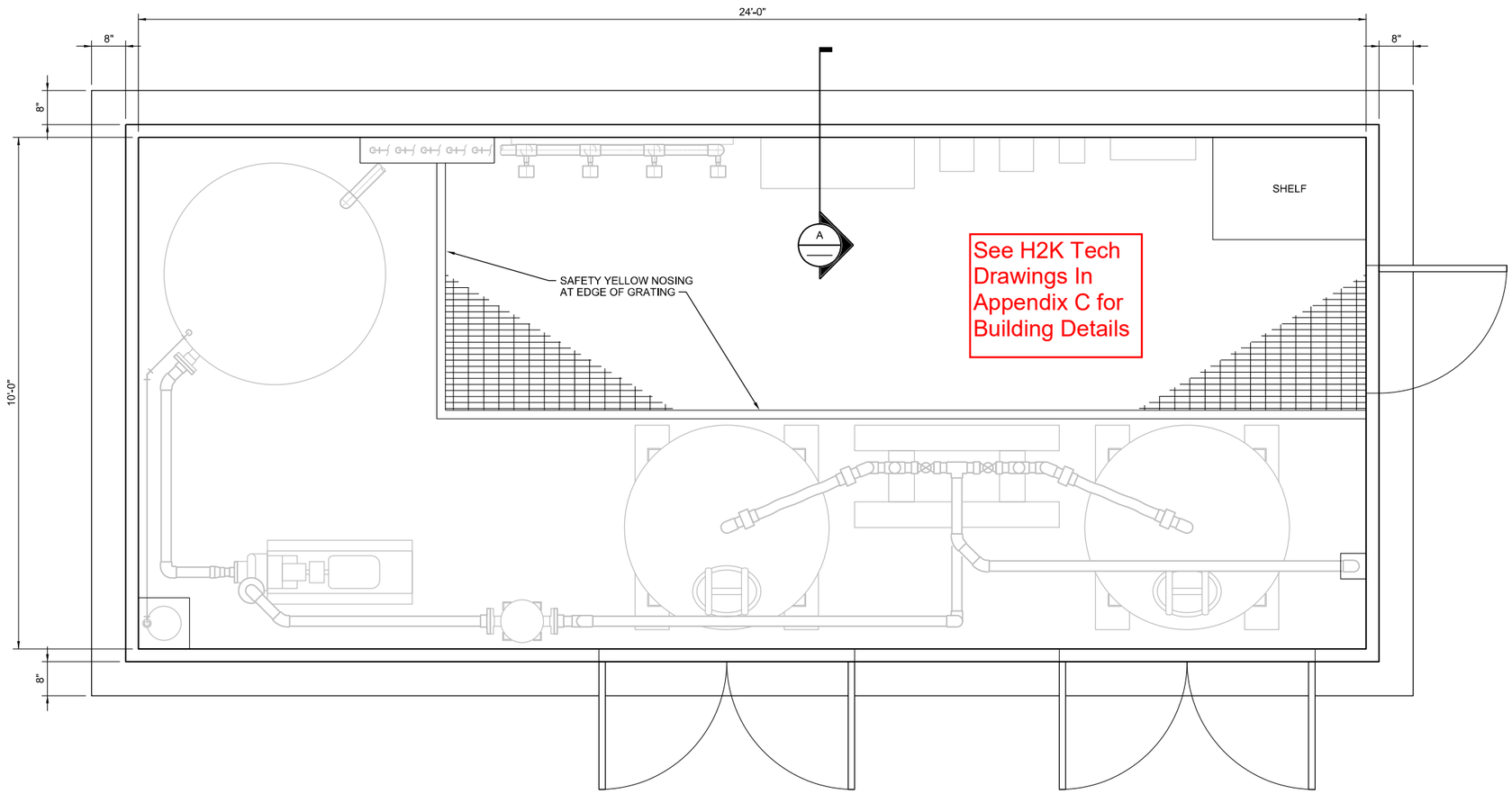
INSTRUMENTATION AND CONTROL
WATER TREATMENT SYSTEM
P&ID

BID DOCUMENTS

NO SCALE
VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING. 0 1"

DATE	FEBRUARY 2014
PROJ	424337
DWG	N-1
SHEET	of

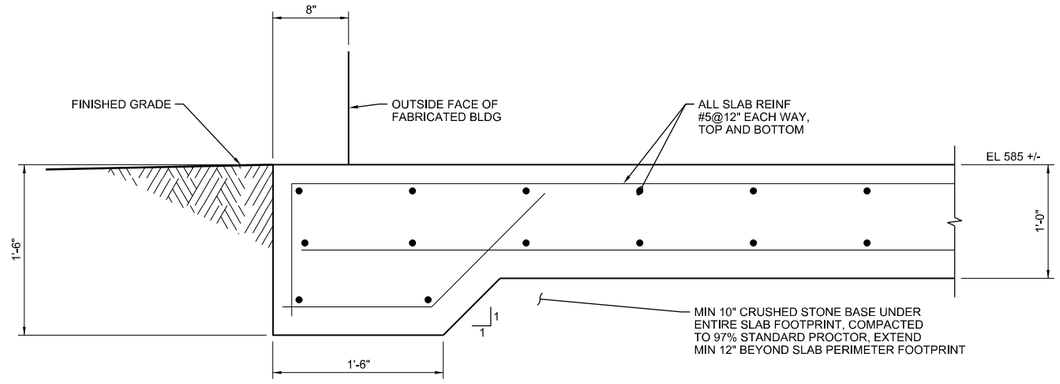
FILENAME: 08-N-001_424337.dgn PLOT DATE: 2/25/2014 PLOT TIME: 1:52:05 PM



BUILDING PLAN

3/4"=1'-0"

N



A TYPICAL PERIMETER FOUNDATION SECTION

1 1/2"=1'-0"

NO.	DATE	REVISION	BY	APVD
DSGN	TE PAIGE	DR DL MICHALEK	CHK EA McKENNA	APVD EA McKENNA

WATER TREATMENT SYSTEM
OMC WAUKEGAN HARBOR
U.S. ENVIRONMENTAL PROTECTION AGENCY
WAUKEGAN, ILLINOIS

CH2MHILL®

ARCHITECTURAL/STRUCTURAL

WATER TREATMENT SYSTEM
BUILDING PLAN AND SECTION

BID DOCUMENTS

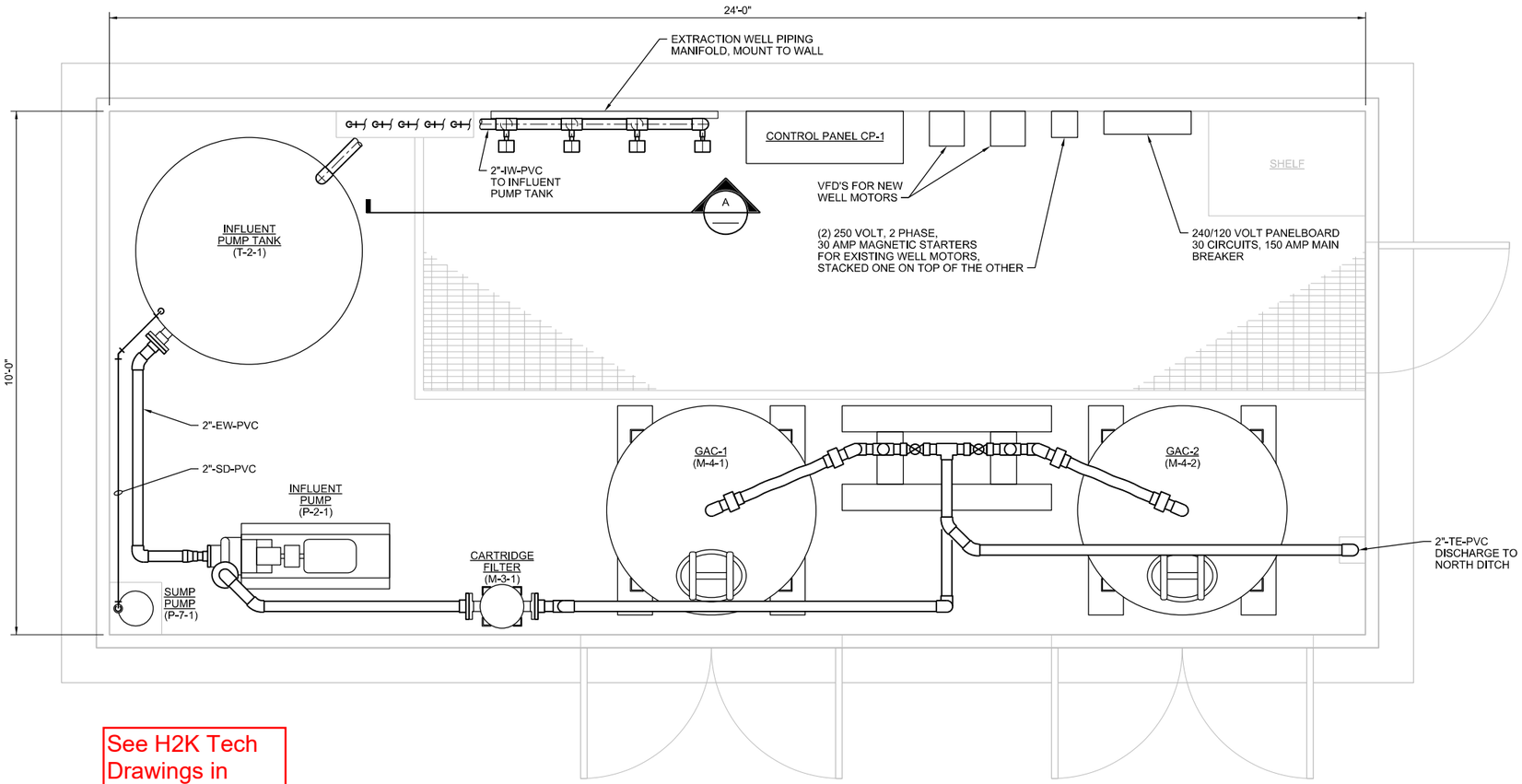
AS SHOWN
VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING. 0 1"

DATE	FEBRUARY 2014
PROJ	424337
DWG	AS-1
SHEET	of

FILENAME: 20-AS-210_424337.dgn PLOT DATE: 2/25/2014 PLOT TIME: 1:54:12 PM

GENERAL NOTES

1. FLOW METER MUST BE INSTALLED IN A TRAP OR WITH UPWARD FLOW SO FLOW ELEMENT IS ALWAYS FULL OF LIQUID, PER MANUFACTURER. FLOW METER MUST BE INSTALLED WITH SUFFICIENT STRAIGHT PIPE UPSTREAM AND DOWNSTREAM, PER MANUFACTURER.
2. GENERAL PIPE ROUTING SHOWN; ACTUAL PIPE ROUTING SHALL INCLUDE ALL VALVES, APPURTENANCES, ETC, AS SHOWN ON THE P&ID (DRAWING N-1).
3. ACTUAL CONNECTIONS TO EXISTING CONVEYANCE PIPING FROM EXISTING RECOVERY WELLS R-5 AND R-6 IN WEST PCB CONTAINMENT CELL TO BE DETERMINED IN THE FIELD.



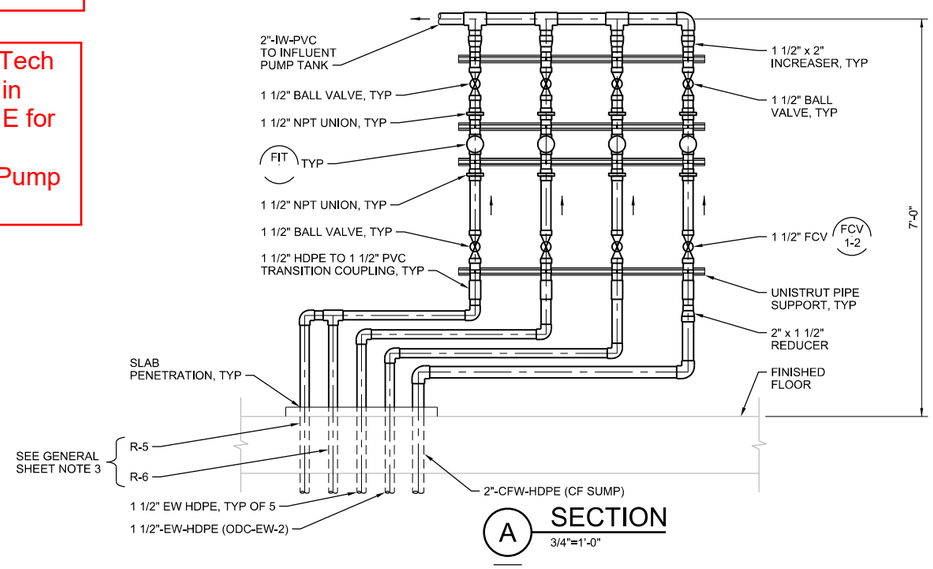
See H2K Tech Drawings in Appendix C for Process System Details

See H2K Tech Drawings in Appendix E for DTA and Metering Pump Details

BUILDING PLAN

3/4"=1'-0"

N



A SECTION

3/4"=1'-0"

NO.	DATE	REVISION	BY	APVD
DSGN	S RAMAMURTHY	DR DA KIERZEK	CHK RA YOLO	APVD EA McKENNA

WATER TREATMENT SYSTEM
OMC WAUKEGAN HARBOR
U.S. ENVIRONMENTAL PROTECTION AGENCY
WAUKEGAN, ILLINOIS

CH2MHILL®

PROCESS MECHANICAL

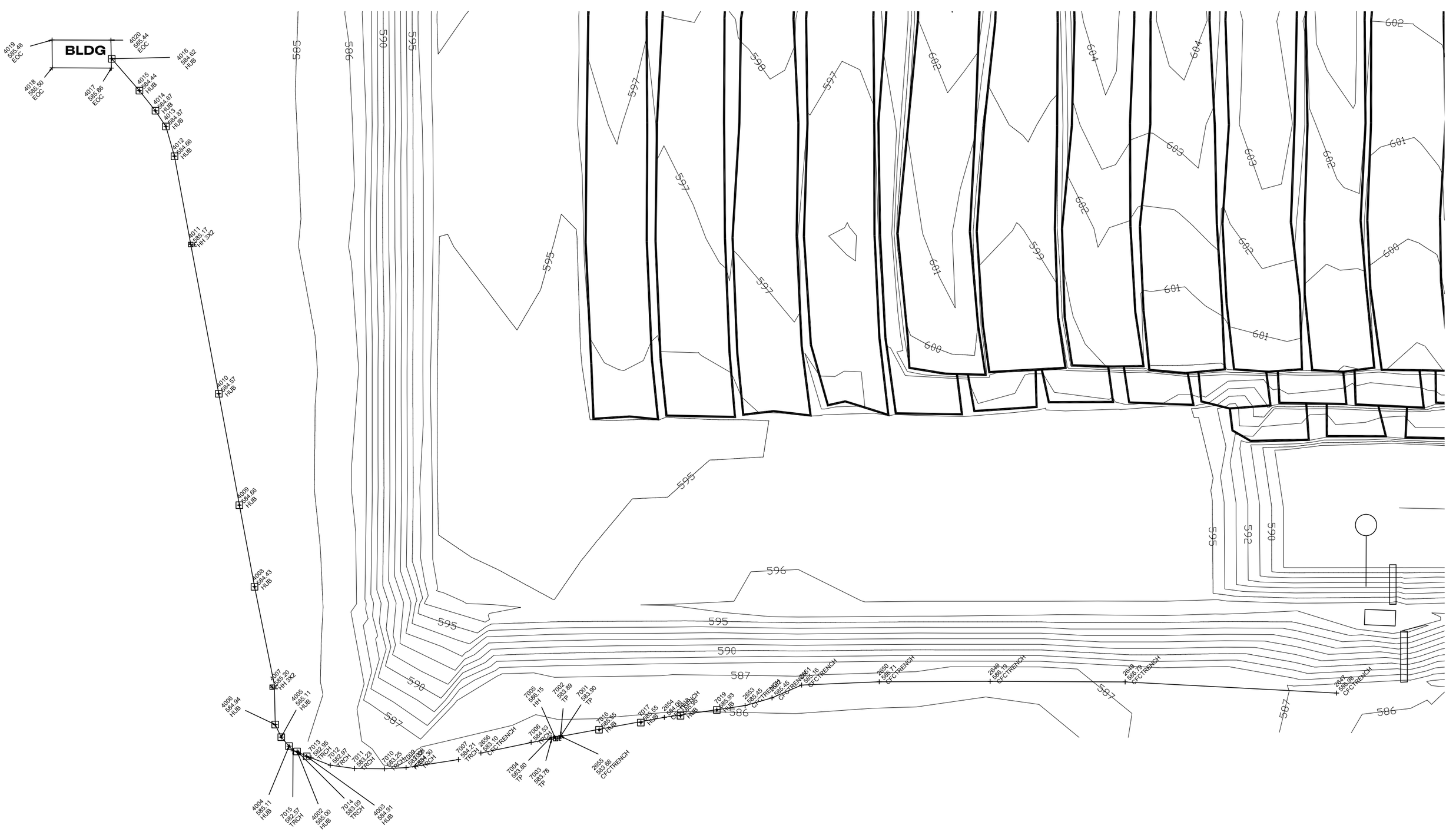
WATER TREATMENT SYSTEM
BUILDING PLAN AND SECTION

BID DOCUMENTS

	3/4"=1'-0"
	VERIFY SCALE
	BAR IS ONE INCH ON ORIGINAL DRAWING. 0 1"
DATE	FEBRUARY 2014
PROJ	424337
DWG	D-1
SHEET	of

FILENAME: 20-D-210_424337.dgn PLOT DATE: 2/25/2014 PLOT TIME: 1:53:48 PM

2647,2077988.8840,1123007.4080,586.9820,CFCTRENCH
2648,2077993.8740,1122912.6060,586.7870,CFCTRENCH
2649,2077994.1860,1122852.1050,586.1940,CFCTRENCH
2650,2077993.9790,1122802.3580,586.7080,CFCTRENCH
2651,2077992.5300,1122767.5350,585.1580,CFCTRENCH
2652,2077986.7770,1122754.2930,585.4540,CFCTRENCH
2653,2077983.3290,1122742.1750,585.4510,CFCTRENCH
2654,2077978.0620,1122706.0110,584.0640,CFCTRENCH
2655,2077969.4850,1122659.5930,583.6770,CFCTRENCH
2656,2077962.0350,1122623.7120,583.0960,CFCTRENCH
4002,2077962.7050,1122541.3400,584.9970,HUB
4003,2077960.5130,1122545.6100,584.9120,HUB
4004,2077965.1360,1122537.7260,585.1150,HUB
4005,2077969.1480,1122534.2110,585.1060,HUB
4006,2077974.7750,1122531.5160,584.9390,HUB
4007,2077991.5510,1122530.1310,585.2030,HH 3X2
4008,2078036.5450,1122522.2440,584.4340,HUB
4009,2078073.1670,1122515.4740,584.6580,HUB
4010,2078123.0860,1122506.2200,584.5700,HUB
4011,2078189.9840,1122493.7010,585.1670,HH 3X2
4012,2078229.5460,1122486.3560,584.6580,HUB
4013,2078242.8440,1122482.5230,584.8750,HUB
4014,2078249.9200,1122477.8140,584.8680,HUB
4015,2078258.9520,1122470.6250,584.4450,HUB
4016,2078273.2210,1122458.2310,584.6240,HUB
4017,2078269.0570,1122458.0990,585.8650,EOC
4018,2078269.1690,1122431.5230,585.4960,EOC
4019,2078281.6480,1122431.4410,585.4820,EOC
4020,2078281.5840,1122457.8650,585.4430,EOC
7001,2077968.6980,1122658.9160,583.9050,TP
7002,2077969.9750,1122659.5030,583.8930,TP
7003,2077968.0290,1122655.4050,583.7850,TP
7004,2077969.2000,1122655.1990,583.7980,TP
7005,2077968.5130,1122657.2020,586.1540,HH
7006,2077966.8200,1122646.2600,584.5270,TRCH
7007,2077959.1360,1122613.6780,584.2050,TRCH
7008,2077956.0870,1122594.3690,584.3000,TRCH
7009,2077955.5090,1122590.1990,583.3200,TRCH
7010,2077954.9700,1122580.5040,583.2450,TRCH
7011,2077955.1320,1122567.0460,583.2300,TRCH
7012,2077956.5600,1122556.2320,582.9670,TRCH
7013,2077959.8830,1122547.5750,582.9510,TRCH
7014,2077962.3350,1122541.9000,583.0870,TRCH
7015,2077963.0450,1122539.5380,582.5650,TRCH
7016,2077972.4540,1122676.7380,585.5540,HUB
7017,2077975.6950,1122695.4610,585.5470,HUB
7018,2077978.7500,1122713.2100,585.9470,HUB
7019,2077981.3590,1122729.5380,585.9270,HUB


BLDG
4019 585.48 EOC
4020 585.44 EOC
4016 584.62 HUB
4018 585.50 EOC
4017 585.86 EOC
4015 584.44 HUB
4014 584.87 HUB
4013 584.87 HUB
4012 584.86 HUB
4011 585.17 FH 3X2
4010 584.57 HUB
4009 584.86 HUB
4008 584.53 HUB
4007 585.20 HH 3X2
4006 584.94 HUB
4005 585.11 HUB
4004 585.11 HUB
7015 582.57 TRCH
4002 585.80 HUB
7014 583.09 TRCH
4003 584.91 HUB
7013 580.95 TRCH
7012 582.97 TRCH
7011 583.23 TRCH
7010 583.25 TRCH
7009 582.94 TRCH
7008 582.30 TRCH
7007 584.21 TRCH
2666 583.10 CFCTRENCH
7005 586.15 HH
7002 582.89 TP
7001 583.90 TP
7006 584.53 TRCH
7004 583.86 TP
7003 583.78 TP
2655 583.88 CFCTRENCH
7016 585.56 HUB
7017 585.55 HUB
2654 584.06 CFCTRENCH
2653 585.45 CFCTRENCH
7019 585.93 HUB
2651 585.45 CFCTRENCH
2650 585.71 CFCTRENCH
2649 586.19 CFCTRENCH
2648 586.79 CFCTRENCH
2647 586.98 CFCTRENCH
585
586
595
590
597
596
587
599
601
602
603
604
600
N 2077886.91
E 1122918.83
EL 587.15
CPIR

PIER Electric Inc.

1101 North Sheridan Road
Waukegan IL 60085
Phone (847) 249-2378
PIER1111@sbcglobal.net

August 6, 2014

Arrowhead Contracting Inc.
1308 N. 14th Street
Indianola, IA 50125

Mr. Josh Phillips,

We are pleased to provide our quotation for electrical services and material as itemized below.

CH2M Hill Solicitation #916 W.T.P.

1. The work on this project has been installed as per the plans and specifications. Except as noted.
    a. Building Grounding: Ground rods at the four corners were not installed. The grounding grid of a 2/0, 7 strand soft drawn copper is attached to the 4 corners and cad welded to the rebar in the slab and then is cad welded to (2) – spaced, 20' sectional ground rods placed outside the containment wall.
    b. Feed from the secondary switch of the 25 kva transformer to building: (1) - #6 XHHW grounding conductor is pulled with the feeder from the secondary switch to the WTS Panelboard in the buildings as per the N.E.C.

This installation will meet or exceed all national and local code requirement and is covered by a
THREE YEAR CRAFTSMANSHIP and a ONE YEAR MATERIAL GUARANTEE!
(Warranty does not cover labor for ballast and lamps)

Thank you for considering PIER Electric for your electrical needs

Sincerely,

Pat Seibert

OMC WAUKEGAN HARBOR SITE, OPERABLE UNIT 1

DRAWING INDEX

PREPARED FOR THE

U.S. EPA REGION 5
CHICAGO, ILLINOIS

DRAWINGS
VOLUME 1 OF 1

For information regarding this project, contact:

Jewelle Keiser
1610 N 2nd St #201
Milwaukee, WI 53212
Office:(414) 847-0469

CH2M 692199

JUNE 2020

FOR CONSTRUCTION PLAN SET

ABBREVIATIONS

A	AMMETER, AMPERES, AWNINGS
AB	ANCHOR BOLT, ABOVE
ABDN	ABANDON
AC	ACOUSTICAL, ACOUSTICAL CEILING
AC	ALTERNATING CURRENT
AC	ASPHALTIC CONCRETE
ACFL	ACCESS FLOORING
ACI	AMERICAN CONCRETE INSTITUTE
ACMU	ACOUSTICAL CONCRETE MASONRY UNIT, ACOUSTICAL CMU
ACP	ACOUSTICAL PANELS
ACST	ACOUSTICAL
ACT	ACOUSTICAL TILE
AD	AREA DRAIN
ADDL	ADDITIONAL
ADJ	ADJACENT
ADW	DRY WEATHER AVERAGE
AFD	ADJUSTABLE FREQUENCY DRIVE
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AG	ACOUSTICAL, ACOUSTICAL GLASS
AGGR	AGGREGATE
AHR	ANCHOR
AISC	AMERICAN INSTITUTE OF STEEL CONSTRUCTION
AJ	ADJUSTABLE
AL	ALUMINUM
ALKY	ALKALINITY
ALTN/ALT	ALTERNATE
AM	AUTO-MANUAL
AMRD	ACOUSTICAL METAL ROOF DECKING
ANDZ	ANODIZE
APPROX	APPROXIMATE
APVD	APPROVED
ARCH	ARCHITECTURAL
AR	ANALOG RELAY
AS	AS SELECTED
ATS	AUTOMATIC TRANSFER SWITCH
AUTO	AUTOMATIC
AUX	AUXILIARY
AVG	AVERAGE
AWW	WET WEATHER AVERAGE
@	AT
	BELL
BAL	BALANCE
BETW	BETWEEN
BF	BLIND FLANGE, BOTTOM FACE
BFV	BUTTERFLY VALVE
BL	BASELINE
BFP	BACKFLOW PREVENTER
BLDG	BUILDING
BLK	BLOCK
BM	BEAM, BENCHMARK
BO	BOTTOM OF
B.O.B.	BOTTOM OF BEAM
BLL	BOTTOM LOWER LAYER
BOD	BOTTOM OF DUCT
BOP	BOTTOM OF PIPE
BOT	BOTTOM
BRG	BEARING
BRK	BRICK
BRKR	BREAKER
BSP	BLACK STEEL PIPE
BUL	BOTTOM UPPER LAYER
BV	BALL VALVE, BLOCK VENT
BVC	BEGINNING OF VERTICAL CURVE
C	CONDUIT, CASEMENT
°C	DEGREE CELSIUS
C TO C	CENTER TO CENTER
CAB	CABINET
CB	CATCH BASIN, CIRCUIT BREAKER
CC	CENTER OF CIRCLE
CC	CONTROL CABLE
CCP	CENTRAL CONTROL PANEL
CCS	CENTRAL CONTROL SYSTEM
CDF	CONTROLLED DENSITY FILL
CE	CONSTRUCTION ENTRANCE
CFM	CUBIC FEET PER MINUTE
CFS	CUBIC FEET PER SECOND
CHEM	CHEMICAL
CHKD	CHECKERED
CI	CAST IRON
CIP	CAST IRON PIPE, CAST IN PLACE
CIP	CULVERT INLET PROTECTION
CISP	CAST IRON SOIL PIPE
CJ	CONSTRUCTION JOINT
CKT	CIRCUIT
CL	CENTERLINE
CLDI	CEMENT LINED DUCTILE IRON
CLSF	CONTROLLED LOW STRENGTH FILL
CLG	CEILING
CLR	CLEAR, CLEARANCE
CLSM	CONTROLLED LOW STRENGTH MATERIAL
CMP	CENTRAL MONITORING PANEL
CMP	CORRUGATED METAL PIPE
CMU	CONCRETE MASONRY UNIT
CNTR	COUNTER
CO	CLEANOUT, CARBON MONOXIDE
COL	COLUMN, COLOR
CONC	CONCRETE
COND	CONDENSATE
CONDTN	CONDITIONED
CONN	CONNECTION
CONSTR	CONSTRUCTION
CONT	CONTINUED, CONTINUOUS, CONTINUATION
CONTR	CONTRACTOR
COORD	COORDINATE
COP	COPPER
CP	CENTER PIVOT
CP-X	CONTROL PANEL NO. X
CPLG	COUPLING
CPRSR	COMPRESSOR
CPT	CONTROL POWER TRANSFORMER, CARPET
CPVC	CHLORINATED PVC
CR	CONTROL RELAY
CRS	COLD ROLLED STEEL
CRS	CONSTRUCTION ROAD STABILIZATION
CT	CERAMIC TILE
CT	CURRENT TRANSFORMER
CTC	COMPUTER TERMINAL CABINET
CTR	CENTER
CTRD	CENTERED
CTSK	COUNTERSUNK
CU	CUBIC
CU FT	CUBIC FOOT
CU IN	CUBIC INCH
CUH	COPPER TUBING, HARD DRAWN
CV	CHECK VALVE
CWR	CABINET DOOR MOUNTED WASTE RECEPTACLE
CY, CU YD	CUBIC YARD
CWS	CLEAN WATER SERVICES
D	DEEP, DRAIN
d	PENNY NAIL SIZE
DA	DUAL ACTION
DAS	DATA ACQUISITION SYSTEM
DBA	DEFORMED BAR ANCHOR
DBL	DOUBLE
DC	DIRECT CURRENT
DEG	DEGREE
DET	DETAIL
DF	DOUGLAS FIR, DRINKING FOUNTAIN
DDI	DROP INLET
DH	DOUBLE HUNG
DI	DUCTILE IRON
DIA	DIAMETER
DIAG	DIAGONAL
DIP	DUCTILE IRON PIPE
DIR	DIRECTION
DISCH	DISCHARGE
DL	DEAD LOAD
DM	DISCHARGE MAIN
DN	DOWN
DO	DISSOLVED OXYGEN
DOL	DIRECT-ON-LINE
DP, DPNL	DISTRIBUTION PANEL
DR	DOOR
DS	DOWNSPOUT
DWG	DRAWING
DWL	DOWEL
△	DELTA
E	EAST, EMPTY
EA	EACH, EXHAUST AIR
EB, EBCT	EMPTY BED CONTACT TIME
ECC	ECCENTRIC
EE	EMERGENCY EYEWASH
EDF	EGG-SHAPED DIGESTER FACILITY
EF	EACH FACE, EXHAUST FAN
EFF	EFFICIENCY, EFFICIENT
EFL	EFFLUENT
EIFS	EXTERIOR INSULATION AND FINISH SYSTEM
EL	ELEVATION
ELB	ELBOW
ELC	ELECTRICAL LOAD CENTER
ELEC	ELECTRIC, ELECTRICAL
ENGR	ENGINEER
EOP	EDGE OF PAVEMENT
ESC	EROSION AND SEDIMENT CONTROL
EP	EXPLOSION PROOF, EDGE OF PAVING
EQL	EQUAL
EQL SP	EQUALLY SPACED
EQPT	EQUIPMENT
ESC	EROSION AND SEDIMENT CONTROL
ETM	ELAPSED TIME METER
EVC	END OF VERTICAL CURVE
EW	EACH WAY
EWC	ELECTRIC WATER COOLER
EXH	EXHAUST
EXP	EXPANSION, EXPOSED
EXP AB	EXPANSION ANCHOR BOLT
EXP JT	EXPANSION JOINT
EXST, EXIST	EXISTING
EXT	EXTERIOR
°F	DEGREE FAHRENHEIT
FB	FLAT BAR
F, FU	FUSE
F, FX	FIXED
FAP	FIRE ALARM PANEL
FC	FLEXIBLE CONDUIT
FCA	FLANGED COUPLING ADAPTER
FCL2	FREE CHLORINE RESIDUAL
FCO	FLOOR CLEANOUT
FCTY	FACTORY
FD	FLOOR DRAIN
FDN	FOUNDATION
FDR	FEEDER
FEXT	FIRE EXTINGUISHER
FF	FINISHED FLOOR
FG	FINISH GRADE, FLOAT GLASS
FH	FLAT HEAD
FHY	FIRE HYDRANT
FIG	FIGURE
FL	FLOW LINE
FLG	FLANGE
FL	FLOOR
FLEX	FLEXIBLE
FLH	FLAT HEAD
FLTR	FILTER
FLUOR	FLUORESCENT
FNSH	FINISH
FOB	FLAT ON BOTTOM
FOT	FLAT ON TOP
FP	FIELD PANEL
FPM	FEET PER MINUTE
FR	FORWARD REVERSE
FRCF	FIBER REINFORCED CONCRETE FILL
FRP	FIBERGLASS REINFORCED PLASTIC
FSHS	FOLDING SHOWER SEAT
FT	FOOT OR FEET
FTG	FOOTING
FU	FIXTURE UNIT
FVNR	FULL VOLTAGE NON-REVERSING
FVR	FULL VOLTAGE REVERSING
FWD	FORWARD
G, GND	GROUND
GA	GAUGE
GAL	GALLON
GALV	GALVANIZED
GB	GYPSUM BOARD
GC	GROOVED COUPLING
GCMU	GLAZED CONCRETE MASONRY UNITS
GFA	GROOVED FLANGE ADAPTER
GFI	GROUND FAULT INTERRUPTER
GFR	GROUND FAULT RELAY
GH	GREENHOUSE
GL	GLASS
GPD	GALLONS PER DAY
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GPS	GLOBAL POSITION SYSTEM
GRTG	GRATING
GSB	GYPSUM SOFFIT BOARD
GSP	GALVANIZED STEEL PIPE
GV	GATE VALVE
GVL	GRAVEL
GWB	GYPSUM WALLBOARD
GYP	GYPSUM
H	HIGH, HORN OR HOWLER
H2S	HYDROGEN SULFIDE
H.A.S.	HEADED ANCHOR STUD
HC	HOLLOW CORE WOOD
HCL	HYDROCHLORIC ACID
HDNR	HARDENER
HDNS	HARDNESS
HDR	HEADER
HDW	HARDWARE
HGL	HYDRAULIC GRADE LINE
HK	HOOK
HGT	HEIGHT
HH	HANDHOLE
HID	HIGH INTENSITY DISCHARGE
HK	HOOK
HM	HOLLOW METAL
HOA	HAND-OFF-AUTO
HOR	HAND-OFF-REMOTE
HORIZ	HORIZONTAL
HP	HORSEPOWER
HPT	HIGH POINT
HPU	HYDRAULIC POWER UNIT
HR	HOSE RACK, HANDRAIL
HV	HOSE VALVE
HVAC	HEATING, VENTILATING AND AIR CONDITIONING
HWL	HIGH WATER LEVEL
IBO	INSTALLED BY OTHERS
IC	INTERRUPTING CAPACITY
ID	INDUCED DRAFT, INSIDE DIAMETER
IE	INVERT ELEVATION
I.F.	INSIDE FACE
IG	INSULATING, INSULATING GLASS
IN	INCH
INCAND	INCANDESCENT
INFL	INFLUENT
INJS	INJECTIONS
INST	INSTANTANEOUS
INSTM	INSTRUMENT, INSTRUMENTATION
INSUL	INSULATION
INVT	INVERT
IP	INLET PROTECTION, INSTRUMENTATION PANEL
IRRIG	IRRIGATION
ITG	INSULATED TEMPERED GLASS
ITX	ISOLATION TRANSFORMER
IU	INTAKE UNIT
IW	IRRIGATION WELL
JA	JALOUSIE JAL-AWNING
JB	JUNCTION BOX
JAN	JANITOR
JCT	JUNCTION
JT	JOINT
K	KEY GROUP, KEY INTERLOCK
KIP	THOUSAND POUNDS
KIT	KITCHEN
K-PL	KICKPLATE
kPa	KILOPASCAL
KSK	KITCHEN SINK
KV	KILOVOLTS
KVA	KILOVOLT AMPERES
KVAR	KILOVOLT AMPERES REACTIVE
KW	KILOWATT
L	ANGLE, LENGTH
LA	LIGHTNING ARRESTER
LAB	LABORATORY
LAM	LAMINATE
LAT	LATITUDE
LB	POUND
LC	LIGHTING CONTACTOR
LD	COMBINATION LOUVER/DAMPER
LDG	LOADING DOCK
LEL	LOWER EXPLOSIVE LIMIT
LF	LINEAR FEET
LG	LONG
LH	LEFT HAND
LL	LIVE LOAD
LHR	LEFT HAND REVERSE
LLH	LONG LEG HORIZONTAL
LLV	LONG LEG VERTICAL
LNTL	LINTEL
LONG	LONGITUDINAL
LOS	LOCK-OUT STOP PUSHBUTTON
LP	LIGHT POLE, LIGHTING PANEL, LOCAL PANEL
LPT	LOW POINT
LR	LATCHING RELAY
LR	LOCAL-REMOTE
LR	LONG RADIUS
LS	LABORATORY SINK
LT	LEFT
LTG, LTS	LIGHTS OR LIGHTING
LTX	LIGHTING TRANSFORMER
LWL	LOW WATER LEVEL
MA	MANUAL-AUTO
MAS	MASONRY
MATL	MATERIAL
MAX	MAXIMUM
MB	MACHINE BOLT
MC	MASONRY CLEARANCE
MC	MODULATE-CLOSE
MCC	MOTOR CONTROL CENTER
MCJ	MASONRY CONTROL JOINT
MDO	MEDIUM DENSITY OVERLAY
MECH	MECHANICAL
MFD	MANUFACTURED
MFR	MANUFACTURER
MGD	MILLION GALLONS PER DAY
MH	MANHOLE, MOUNTING HEIGHT
MIN	MINIMUM
MISC	MISCELLANEOUS
MJ	MECHANICAL JOINT
MLO	MAIN LUGS ONLY
MMDW	DRY WEATHER MAXIMUM MONTH
MMP	MECHANICAL MOUNTING PANEL
MMWW	WET WEATHER MAXIMUM MONTH
MO	MANUAL OPERABLE, MASONRY OPENING
MP	METAL PANEL
MPa	MEGAPASCAL
MPU	MULTIPURPOSE UNIT
MS	MANUFACTURER'S STANDARD
MSC	MANUFACTURER SUPPLIED CABLE
MSH	MOTOR SPACE HEATER
MSR	GROUPED MOTOR CONTROL
MT	MOUNT
MTD	MOUNTED
MTG	MOUNTING
MTS	MANUAL TRANSFER SWITCH
MTS	MILL TYPE STEEL PIPE
MU	MULCHING
MV	MERCURY VAPOR
MWS	MAXIMUM WATER SURFACE
N	NORTH, NEUTRAL
NA	NOT APPLICABLE
NA	NON-AUTOMATIC
NC	NORMALLY CLOSED
NEUT	NEUTRAL
NG	NATURAL GAS
NGVD	NATIONAL GEODETIC VERTICAL DATUM
NIC	NOT IN CONTRACT
N.O.	NORMALLY OPEN
NO., #	NUMBER
NOM	NOMINAL
NP	NON-PROTECTED
NPT	NATIONAL PIPE THREADS
NS	NON-SHRINK
NTS	NOT TO SCALE
O2	OXYGEN
O TO O	OUT TO OUT
OA	OVERALL, ODOROUS AIR
OC	ON CENTER
OC	OPEN-CLOSE (O)
OCA	OPEN-CLOSE-AUTO
OCR	OPEN-CLOSE-REMOTE
OD	OUTSIDE DIAMETER, OVERFLOW DRAIN
O.F.	OUTSIDE FACE
OFCI	OWNER FURNISHED, CONTRACTOR INSTALLED
OFOI	OWNER FURNISHED, OWNER INSTALLED
OL	OVERLOAD RELAY
OO	ON-OFF
OOA	ON-OFF-AUTO
OOR	ON-OFF-REMOTE
OP	OPAQUE PANEL, OUTLET PROTECTION
OPER	OPERATOR
OPNG	OPENING
OPP	OPPOSITE
OSA	OUTSIDE AIR
OSC	OPEN-STOP-CLOSE
OSD	OPEN SITE DRAIN
OWSJ	OPEN WEB STEEL JOIST
OZ	OUNCE
P	PROJECTED
P	PILASTER, PIPE
PAVT	PAVER TILE
PB	PUSHBUTTON SWITCH
PC	POINT OF CURVE, PHOTOCELL
PC	PRECAST CONCRETE PANEL
PCCP	PRECAST CONCRETE CYLINDER PIPE
PCV	PRESSURE CONTROL VALVE
PE	PLAIN END
PED	PEDESTAL, PEDESTRIAN
PEP	POLYETHYLENE PIPE
PEN.	PENETRATION
PFC	POUNDS PER CUBIC FOOT
PH	PENTHOUSE
pH	HYDROGEN ION CONCENTRATION
PH	PHASE
PI	POINT OF INTERSECTION
PIT	PILOT TUBE TEST STATION
PJF	PREMOULDED JOINT FILLER
PL	PLATE (STEEL)
PL	PROPERTY LINE
PLAM	PLASTIC LAMINATE
PLAS	PLASTER, PLASTIC
PLC	PROGRAMMABLE LOGIC CONTROLLER
PLYWD	PLYWOOD
PNL	PANEL
PP	POWER POLE
P-P	PUSH-PULL
PPL	POLYPROPYLENE LINED
PR	PAIR
PRC	POINT OF REVERSE CURVE
PRCST	PRECAST
PREFAB	PREFABRICATION
PRES	PRESSURE
PRI	PRIMARY
PRM	PERMANENT REFERENCED MARKER
PROJ	PROJECTION
PROP	PROPERTY
PS	PLASTIC SHEET, POLYCARBONATE SHEET
PS	PAINT SYSTEM
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PSIG	POUNDS PER SQUARE INCH, GAUGE
PT	POINT OF TANGENCY
PT	POTENTIAL TRANSFORMER
PT	PRESSURE TREATED
PTD	PAPER TOWEL DISPENSER
PTN	PARTITION
PV	PLUG VALVE
PVC	POLYVINYL CHLORIDE
PVI	POINT OF VERTICAL INTERSECTION
PVMT	PAVEMENT
PVT	POINT OF VERTICAL TANGENCY
QAA	AVERAGE FLOW
QMM	MAXIMUM 30 DAY FLOW
QPI	PEAK INSTANTANEOUS FLOW
QPP	PEAK PUMPING FLOW
QT	QUARRY TILE
R	RISER
R OR RAD	RADIUS
RA	RETURN AIR
RC	REINFORCED CONCRETE
RCP	REINFORCED CONCRETE PIPE
RCPT	RECEPTACLE
RD	ROAD, ROOF DRAIN
RDCR	REDUCER
RDW	REDWOOD
RECIR	RECIRCULATION
REF	REFER OR REFERENCE
REFR	REFRIGERATE, REFRIGERANT
REINF	REINFORCED, REINFORCING, REINFORCE
REQD	REQUIRED
RESIL	RESILIENT
RFS	ROLL-UP FIRE SHUTTER
RH	RIGHT HAND
RH	RODHOLE
RHR	RIGHT HAND REVERSE
RL	RAIN LEADER
RLD	RAIN LOAD
RLS	RUBBER LINED STEEL
RM	ROOM
RO	ROUGH OPENING
ROL	RAISE-OFF-LOWER
RPM	REVOLUTIONS PER MINUTE
RR	RIPRAP

NOTES:

1. CONTACT ENGINEER FOR ABBREVIATIONS USED BUT NOT SHOWN ON THIS DRAWING.

GENERAL NOTE:

1. THIS IS A STANDARD LEGEND SHEET. THEREFORE, NOT ALL OF THE INFORMATION SHOWN MAY BE USED ON THIS PROJECT.

LICENSED PROFESSIONAL ENGINEER OF ILLINOIS
JENNIFER S. SEAMAN
062-062044
Exp. 11/30/21

NO.	DATE	DSGN

REVISION	CHK	DR
	JAM	JAM

APVD	BY	APVD
		RM

SEAL/NAME

OMC WAUKEGAN HARBOR SITE, OPERABLE UNIT 1
WAUKEGAN, ILLINOIS
U.S. EPA REGION 5
CHICAGO, ILLINOIS

ch2m:

CIVIL
ABBRIEVIATIONS

VERIFY SCALE

BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE	06/16/2020
PROJ	692199
DWG	G01
SHEET	02 of 12

ABBREVIATIONS

RRUB	RADIAL RUBBER
RS	RIGID STEEL
RST	REINFORCING STEEL
RT	RIGHT
RTN	RETURN
RTO	REGENERATIVE THERMAL OXIDIZER
RUB	RUBBER
RUBC	RUBBER CUSHIONED FLOORING
RUBS	RUBBER ESD CONTROL FLOORING
R/W	RIGHT OF WAY
S	I-BEAM
S	SLOPE, SOUTH, SWITCH
SA	SUPPLY AIR
SATC	SUSPENDED ACOUSTICAL TILE CEILING
SB	SEDIMENT BASIN
SC	SHOWER CURTAIN, SOLID CORE WOOD
SCADA	SUPERVISORY CONTROL AND DATA ACQUISITION
SCC	SOLID CORE
SCFM	STANDARD CUBIC FEED PER MINUTE
SCHED	SCHEDULE
SCU	SPEED CONTROL UNIT
SDP	SUB-DISTRIBUTION PANEL
SDWK	SIDEWALK
SEC	SECONDARY
SECT	SECTION
SED	SEDIMENTATION
SEW	SEWAGE
SG	LAMINATED SAFETY GLASS, SAFETY
SGWB	SUSPENDED GYPSUM WALL BOARD
SH	SHEET
SHA	SURFACE HARDENING AGENT
SHS	SOLIDS HANDLING SYSTEM
SIM	SIMILAR
SK	SINK
SL	SNOW LOAD
SLR	SEALER
SMLS	SEAMLESS EPOXY
SOI	SPRAY- ON INSULATION
SOLN	SOLUTION
SP	SPACE OR SPACES, SPANDREL PANEL, STORMPROOF
SPEC, SPECS	SPECIFICATIONS
SPD	SUMP PUMP DISCHARGE
SPG	SPACING
SPLY	SUPPLY
SQ	SQUARE
SQ FT	SQUARE FOOT, FEET
SQ IN	SQUARE INCH
SR	SHORT RADIUS
SS	START-STOP
SST	STAINLESS STEEL
SSC	SUPERVISORY SET POINT CONTROL
ST	STORM DRAIN
ST	STRAIGHT
STA	STATUS, STATION
STD	STANDARD
STIF	STIFFENER
STIRR	STIRRUP
STL	STEEL
STRL	STRUCTURAL
STRUCT	STRUCTURE
SUBFL	SUBFLOOR
SUSP	SUSPENDED
SV	SOLENOID VALVE
SVIN	SHEET VINYL
SWBD	SWITCHBOARD
SWGR	SWITCHGEAR
SYMM	SYMMETRICAL
T	THERMOSTAT, TREAD
T&B	TOP AND BOTTOM
T&G	TONGUE AND GROOVE
TA	TRANSFER AIR
TAN	TANGENT
TB	TERMINAL BOARD
TBG	TUBING
TC	TIME TO CLOSE
TC	TURBIDITY CURTAIN
TCAD	TIME CLOSE AFTER DE-ENERGIZATION
TCAE	TIME CLOSE AFTER ENERGIZATION
TDH	TOTAL DYNAMIC HEAD
TDR	TIME DELAY RELAY
TECH	TECHNICAL
TEL	TELEPHONE
TEMP	TEMPORARY, TEMPERATURE
TF	TOP FACE
TFG	TEMPERED FLOAT GLASS
TG	TEMPERED
TH	TOP-HINGED
THD	THREAD
THK	THICKNESS
THRU	THROUGH
TJB	TERMINAL JUNCTION BOX
TL	TEFLON LINED PIPE
T.O.	TIME TO OPEN, TOP OF
TOAE	TIME OPEN AFTER ENERGIZATION
TOC	TOP OF CONCRETE
TOC	TOP OF CURB
TOD	TIME ON DELAY, TOP OF DUCT TOTAL OXYGEN DEMAND
TOF	TOP OF FOOTING
TOG	TOP OF GROUT, TOP OF GRATE
T.O.P.	TOP OF PARAPET
TOS	TOP OF SLAB
TOW	TOP OF WALL
TP	TURNING POINT
TPS	THERMAL PROTECTIVE SYSTEM
TR	TRANSOM, TRUSS
TRANS	TRANSFORMER, TRANSITION
TRANSV	TRANSVERSE
TRD	TREAD
TS	TEMPORARY SEEDING, TUBE STEEL
TSHT	THRESHOLD
TSS	TOTAL SUSPENSION SOLIDS
TST	TOP OF STEEL
TTC	TELEPHONE TERMINAL CABINET
TTD	TOILET TISSUE DISPENSER
TU-X	TREATMENT UNIT NO. X
TURB	TURBIDITY
TWP	TRANSLUCENT WALL PANEL
TX	TRANSFORMER
TYP	TYPICAL
UON	UNLESS OTHERWISE NOTED
UNO	UNLESS NOTED OTHERWISE
UPS	UNINTERRUPTIBLE POWER SUPPLY
USB	UNIT SUBSTATION
UVR	UNDER VOLTAGE RELAY
V	VENT, VALVE
V	VOLTMETER, VOLTS
VB	VAPOR BARRIER (RETARDER)
VC	VERTICAL CURVE
VCP	VITRIFIED CLAY PIPE
VCT	VINYL COMPOSITION TILE
VEL	VELOCITY
VERT	VERTICAL
VHC	VOLATILE HYDROCARBONS
VIB	VIBRATION
VIF	VERIFY IN FIELD
VIN	VINYL
VINT, VT	VINYL TILE
VP	VERTICAL PIVOTED
VPS	VENEER PLASTER SYSTEM
VPC	POINT OF VERTICAL CURVATURE
VPI	POINT OF VERTICAL INTERSECTION
VPT	POINT OF VERTICAL TANGENT
VS	VERTICAL SLIDE
VTR	VENT THRU ROOF
VWC	VINYL WALL COVERING
W	WEST
W/	WITH
W/O	WITHOUT
WC	WATER COLUMN
WEASTRIP	WEATHERSTRIP
WG	WIRE, WIRE GLASS
WH	WATTHOUR METER
WHD	WATTHOUR DEMAND METER
WP	WATERPROOF, WEATHERPROOF, WORKPOINT
WR	WASTE RECEPTACLE
WRB	WATER RESISTANT GWB
WS	WATER SURFACE, WATERSTOP, WELDED STEEL
WWF	WELDED WIRE FABRIC
WWPH	WET WEATHER PEAK HOUR

NOTES:

1. CONTACT ENGINEER FOR ABBREVIATIONS USED BUT NOT SHOWN ON THIS DRAWING.

SECTION / DETAIL DESIGNATIONS

SECTION (LETTER) OR DETAIL (NUMERAL) DESIGNATION — A

DRAWING NUMBER (REPLACED WITH A LINE IF TAKEN AND SHOWN ON SAME SHEET)

ON DRAWING WHERE SECTION OR DETAIL IS TAKEN: 1 / 100-A-101 — DRAWING NUMBER WHERE SHOWN

B — SECTION — SCALE — 100-S-301 — ON DRAWING WHERE SECTION IS SHOWN: DRAWING NUMBER(S) WHERE TAKEN

2 — DETAIL — SCALE — 200-M-101 — ON DRAWING WHERE DETAIL IS SHOWN: DRAWING NUMBER(S) WHERE TAKEN

DRAWING TITLE — SCALE — ON DRAWING WHERE ONLY A TITLE IS REQUIRED WITH NO REFERENCE (eg: ELEVATIONS)

B — SECTION CALLOUT WHERE SECTION IS ON THE SAME SHEET AND CUT EXTENDS TO A FIXED LIMIT

B 450-S-102 — B 450-S-102 — SECTION CALLOUT WHERE SECTION IS ON ANOTHER SHEET AND CUT EXTENDS THROUGHOUT ENTIRE SHEET

1 — GRID LINE INDICATOR

1 — KEYNOTE NUMBER

1 — REVISION / ADDENDA NUMBER

N — NORTH ARROW; CAN BE MODIFIED TO INCLUDE MAGNETIC NORTH ALONG WITH PROJECT NORTH

DESIGN DETAIL DESIGNATION

DESIGN DETAIL DESIGNATION (NUMERAL) SHOWN ON DESIGN DETAIL DRAWING(S) — 1234-567

NOTES:

1. ALL DESIGN DETAILS ARE TYPICAL AND MUST BE USED IF DESIGN DETAIL DESIGNATION IS NOT SHOWN
2. THE TERM STANDARD DETAIL, OR A FORM OF IT, IS SYNONYMOUS WITH DESIGN DETAIL. THE DESIGN DETAILS REPRESENT THE CHARACTER AND NATURE OF THE WORK REQUIRED THROUGHOUT THE PROJECT. ALL ASSOCIATED WORK SHALL BE IN ACCORDANCE WITH THE DESIGN DETAILS SHOWN WHETHER THE DETAILS ARE SPECIFICALLY REFERENCED OR NOT.

NOTES:

1. EXISTING CONDITIONS MAY VARY FROM THOSE SHOWN ON THESE PLANS. THE SUB-CONTRACTOR SHALL VERIFY EXISTING CONDITIONS AND ADJUST WORK PLAN ACCORDINGLY PRIOR TO BEGINNING CONSTRUCTION.
2. EXISTING TOPOGRAPHY, STRUCTURES AND SITE FEATURES ARE SHOWN SCREENED AND/OR LIGHT-LINED, PROPOSED FINISH GRADE, STRUCTURES AND SITE FEATURES ARE SHOWN HEAVY-LINED UNLESS OTHERWISE INDICATED.
3. HORIZONTAL DATUM: NAD 83 STATE PLANE ILLINOIS EAST US SURVEY FEET
4. VERTICAL DATUM NAVD 88
5. MAINTAIN, RELOCATE OR REPLACE EXISTING SURVEY MONUMENTS, CONTROL POINTS AND STAKES WHICH ARE DISTURBED OR DESTROYED. PERFORM THE WORK TO PRODUCE THE SAME LEVEL OF ACCURACY AS THE ORIGINAL MONUMENT(S) IN A TIMELY MANNER, AND AT THE SUB CONTRACTOR'S EXPENSE.
6. PROVIDE TEMPORARY FENCING AS NECESSARY TO MAINTAIN SECURITY AT ALL TIMES.
7. ELEVATIONS GIVEN ARE TO FINISH GRADE (TOP OF SOD) UNLESS OTHERWISE SHOWN.
8. SLOPE UNIFORMLY BETWEEN CONTOURS AND SPOT ELEVATIONS SHOWN.
9. TAKE ALL OTHER MEASURES TO POSITIVELY PRECLUDE EROSION MATERIALS FROM LEAVING THE SITE.
10. EXISTING UNDERGROUND UTILITIES OBTAINED FROM AS-BUILTS AND FROM FIELD SURVEY. CONTRACTOR SHALL FIELD VERIFY DEPTH AND LOCATION PRIOR TO EXCAVATION. PROTECT ALL EXISTING UTILITIES DURING CONSTRUCTION.
11. TOTAL TREATMENT WETLAND WETTED AREA = 0.77 AC
12. TOTAL TREATMENT WETLAND AREA FOOTPRINT = 1.56 AC

LEGEND

- Existing West Containment Cell Slurry Wall
- 585 — Topographic Contour
- PVC Sanitary Sewer Force Main
- Underground Gas Main
- Concrete Storm Drain
- Underground Water Main
- Fence Line
- Electrical Conduit
- Extraction Well Piping
- Shallow Control Cable
- Control Cable Conduit
- Concrete Sanitary Sewer
- Underground Telephone Line
- Abandoned Sanitary Sewer Force Main
- Railroad Tracks
- Piezometer
- Sanitary Sewer Manhole
- Storm Sewer Manhole
- Well Location
- Extraction Well
- Pull Box
- Sanitary Sewer Standpipe
- Rip Rap

GENERAL NOTE:

1. THIS IS A STANDARD LEGEND SHEET. THEREFORE, NOT ALL OF THE INFORMATION SHOWN MAY BE USED ON THIS PROJECT.

LICENSED PROFESSIONAL ENGINEER JENNIFER S. SEAMAN 062-062044 STATE OF ILLINOIS Exp. 11/30/21

NO.	DATE	REVISION	BY	APVD

DSGN | DR JAM | CHK JAM | APVD RM

OMC WAUKEGAN HARBOR SITE, OPERABLE UNIT 1
WAUKEGAN, ILLINOIS
U.S. EPA REGION 5
CHICAGO, ILLINOIS

ch2m:

CIVIL
ABBRIEVIATIONS
GENERAL LEGEND & NOTES

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE	06/16/2020
PROJ	692199
DWG	G02
SHEET	03 of 12

EXISTING WATER TREATMENT SYSTEM (TREATS WATER FROM WEST PCB CELL, ODC CELL AND CF)

PROPOSED 183 LF – 8' CHAINLINK FENCE WITH PRIVACY SLATS AROUND WATER TREATMENT SYSTEM
1 DOUBLE SWING ACCESS GATES AT 20'
1 SINGLE GATE AT 10' WIDE
(SEE DETAIL SHEET D01

EXISTING SLURRY WALL, TYP.

EXISTING ELECTRICAL AND COMMUNICATIONS CONDUIT FROM ODC PCB CELL

INACTIVE UTILITIES, TYP.

PROPOSED 2" DR-17 HDPE FORCE MAIN FROM WTS TO TREATMENT WETLAND

RELOCATE EXISTING CONCRETE RUBBLE OUTSIDE OF WORK AREA PRIOR TO PROCEEDING WITH PROPOSED WORK

25' MIN. SETBACK TO EX. SLURRY WALL

25' MIN. SETBACK TO ROAD

HDPE PIPE TO CF (KEEP)

EXISTING ELECTRICAL AND COMMUNICATIONS CONDUIT FROM EAST CELL

DISCHARGE TEE ASSEMBLY (DISCONNECT AND CAP PIPE GOING TO SURFACE DISCHARGE)

HDPE PIPE TO SURFACE DISCHARGE (DEMO)

PROPOSED TREATMENT WETLAND

1 2 1,367 LF PROPOSED SILT FENCE.

NOTES:

1. SOIL STOCKPILES SHALL BE WITHIN THE PROJECT AREA AND SILT FENCES.
2. CLEARING / GRUBBING AND TEMPORARY SUBCONTRACTOR STAGING AREAS MUST BE WITHIN THE LIMITS OF THE SILT FENCE. SILT FENCE LIMITS MAY BE ADJUSTED AS NEEDED TO FIT THE STAGING AREA AND AS REQUIRED BY SUBCONTRACTOR'S APPROVED SWPPP.
3. SUB-CONTRACTOR SHALL PROTECT EXISTING MONITORING WELLS FROM DAMAGE CAUSED BY THE WORK.

SITE CONTROL				
POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
1	2078395.41	1122356.79	600.18	CPIR
2	2078124.55	112351563.00	584.74	CPX
3	2077886.91	1122918.83	587.15	CPIR
4	2077501.76	1122689.12	588.40	CPX

REFERENCE CONTROL - NGS - MONUMENT				
DG8502	2083247.26	1119700.45	666.67	WK 105
DG8504	2075456.47	1120352.94	633.86	WK 107

LICENSED PROFESSIONAL ENGINEER
JENNIFER S. SEAMAN
062-062044
STATE OF ILLINOIS
Exp. 11/30/21

SCALE IN FEET 0 30 60 90

NO.	DATE	DSGN	REVISION	BY	APVD
		JAM	DR	JAM	RM
			CHK		

SEALNAME

OMC WAUKEGAN HARBOR SITE,
OPERABLE UNIT 1
WAUKEGAN, ILLINOIS
U.S. EPA REGION 5
CHICAGO, ILLINOIS

ch2m:

CIVIL

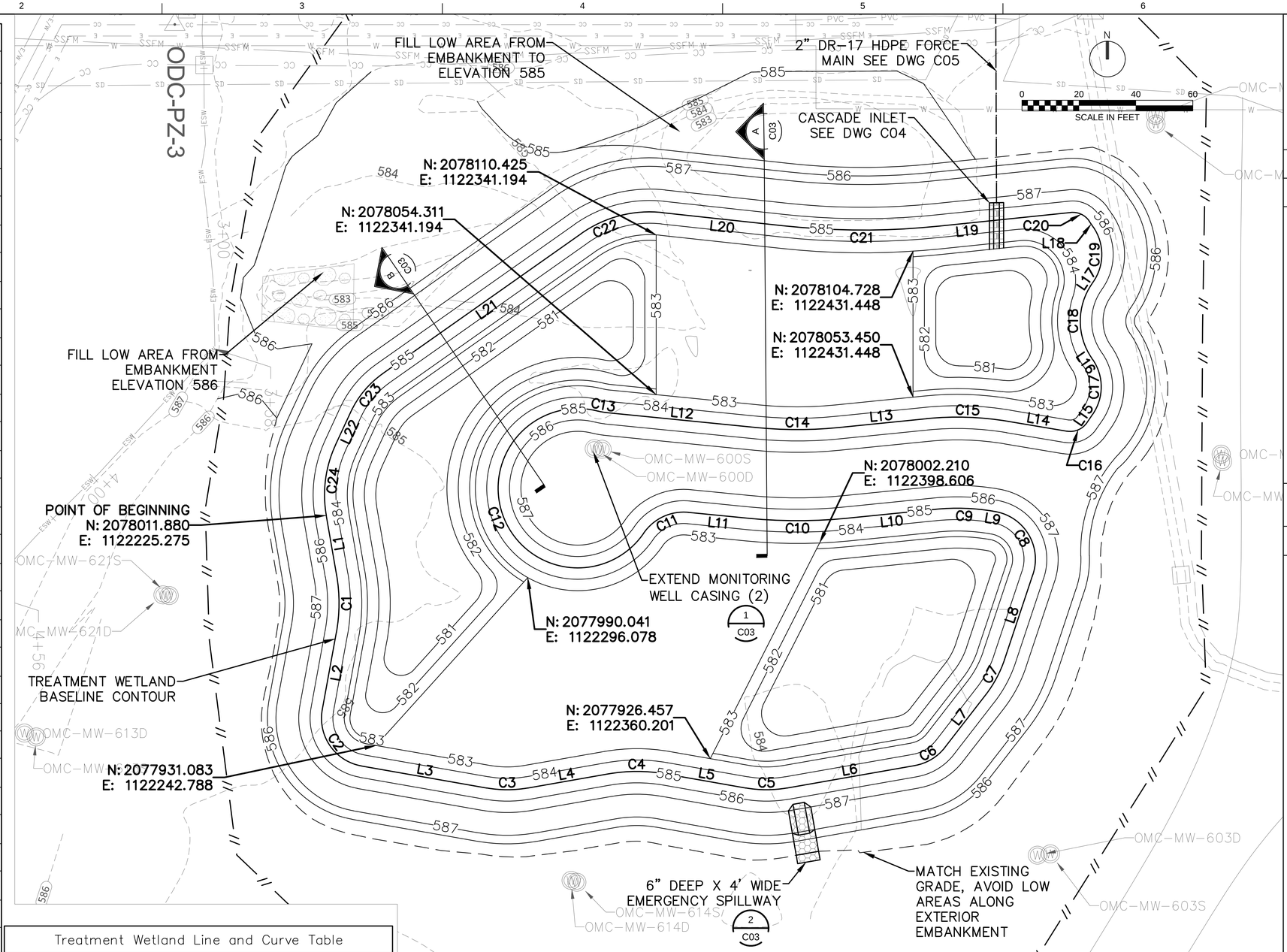
SITE PLAN & SESC PLAN

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE	06/16/2020
PROJ	692199
DWG	C01
SHEET	04 of 12

Treatment Wetland Line and Curve Table			
Line #/Curve #	Length	Bearing/Delta	Radius
L1	21.23	S9° 49' 37.06"E	
C1	20.41	20.16	58.00
L2	27.45	S10° 20' 01.62"W	
C2	26.81	90.37	17.00
L3	44.61	S80° 02' 10.44"E	
C3	14.61	19.93	42.00
L4	28.67	N80° 02' 10.44"E	
C4	20.17	19.93	58.00
L5	28.67	S80° 02' 10.44"E	
C5	14.61	19.93	42.00
L6	45.60	N80° 02' 10.44"E	
C6	12.54	42.26	17.00
L7	23.39	N37° 46' 29.87"E	
C7	14.18	19.34	42.00
L8	31.44	N18° 25' 58.12"E	
C8	29.34	98.89	17.00
L9	0.67	N80° 27' 25.11"W	
C9	20.26	15.28	76.00
L10	31.36	S84° 15' 59.49"W	
C10	34.65	11.41	174.00
L11	21.15	N84° 19' 21.93"W	
C11	18.20	61.35	17.00
C12	122.42	250.51	28.00
C13	2.72	9.16	17.00
L12	53.48	S84° 19' 21.93"E	
C14	28.28	11.41	142.00
L13	31.36	N84° 15' 59.49"E	
C15	28.80	15.28	108.00
L14	20.96	S80° 27' 25.11"E	
C16	7.92	64.86	7.00
L15	3.62	N34° 41' 10.58"E	
C17	20.48	69.03	17.00
L16	0.67	N34° 20' 31.79"W	
C18	27.71	69.03	23.00
L17	0.79	N34° 41' 10.58"E	
C19	20.48	69.03	17.00
L18	2.60	N34° 20' 31.79"W	
C20	7.52	61.56	7.00
L19	46.74	S84° 05' 36.74"W	

Treatment Wetland Line and Curve Table			
Line #/Curve #	Length	Bearing/Delta	Radius
C21	54.46	12.09	258.00
L20	42.74	N83° 48' 44.35"W	
C22	30.28	41.67	41.64
L21	85.22	S54° 49' 29.31"W	
C23	17.82	30.02	34.00
L22	12.74	S24° 47' 59.58"W	
C24	25.34	34.86	41.65



NOTES:

1. AVOID LOW SPOTS ALONG EXTERIOR TOE OF EMBANKMENT, GRADE WHERE REQUIRED DRAIN AWAY FROM WETLAND BERM
2. ALL GRADING IS REFERENCED TO FINISH GRADE (TOP OF SOD). REFERENCE SOIL PREP AND SODDING SPECIFICATIONS FOR TOPSOIL REQUIREMENTS
3. TREATMENT WETLAND REFERENCE BASELINE CONTOUR IS SET TO ELEVATION 585, WHICH CORRESPONDS WITH THE LIMITS OF SOD PLACEMENT AND WETLAND PLANTINGS

LICENSED PROFESSIONAL ENGINEER OF ILLINOIS
JENNIFER S. SEAMAN
062-062044
Exp. 11/30/21

NO.	DATE	REVISION	BY	APVD
DSGN	JAM			SEALNAME
DR	JAM			
CHK	JAM			
APVD	RM			

OMC WAUKEGAN HARBOR SITE,
OPERABLE UNIT 1
WAUKEGAN, ILLINOIS
U.S. EPA REGION 5
CHICAGO, ILLINOIS

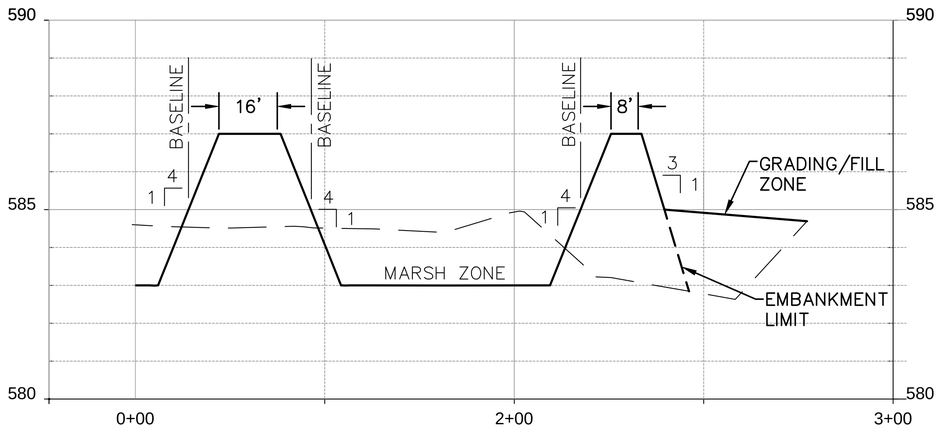
ch2m:

CIVIL

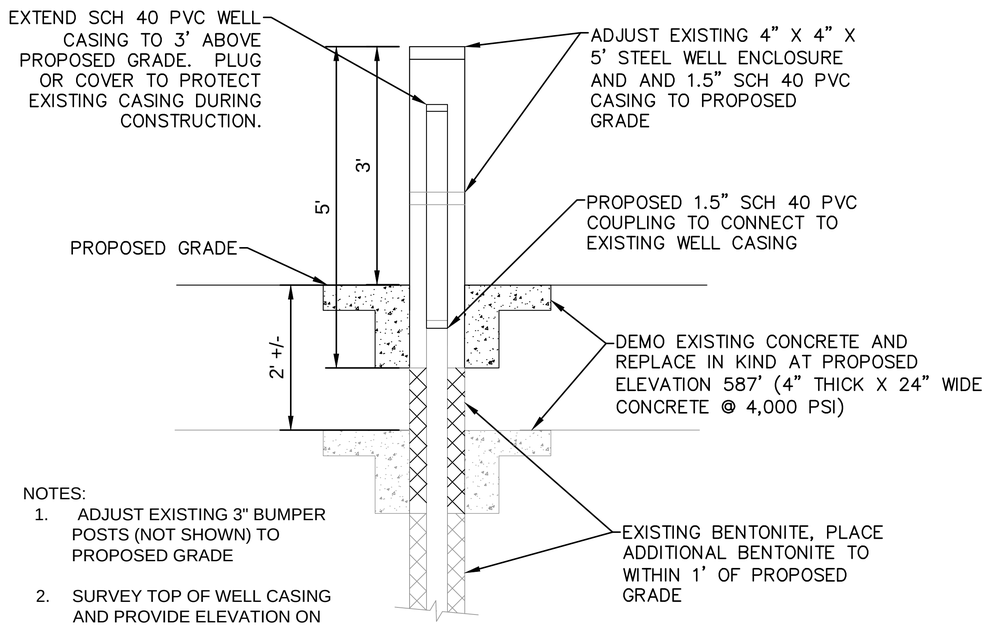
TREATMENT WETLAND GRADING PLAN

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE	06/16/2020
PROJ	692199
DWG	C02
SHEET	05 of 12

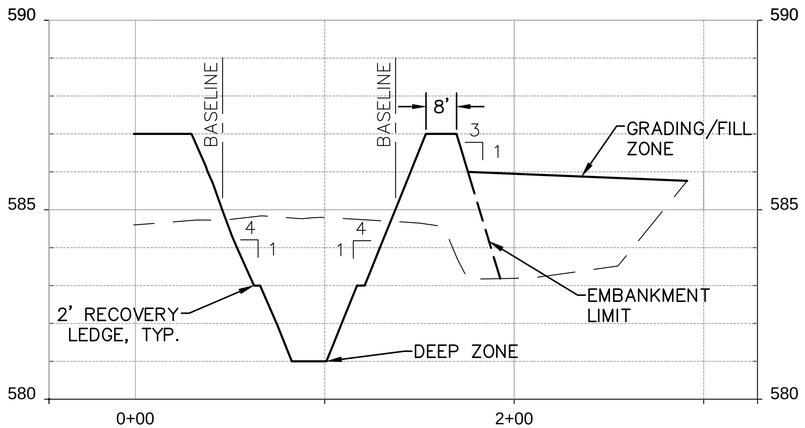


A C02 SECTION
SCALE: 1"=20' HORIZ
1"=2' VERT

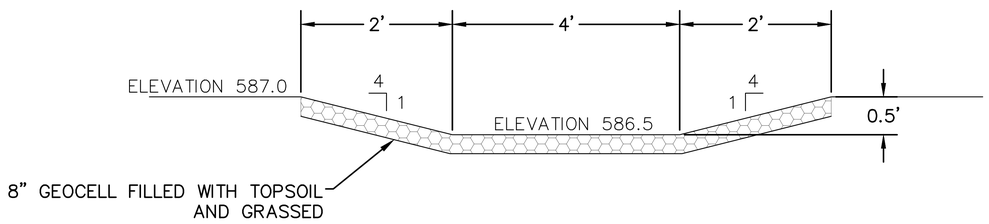


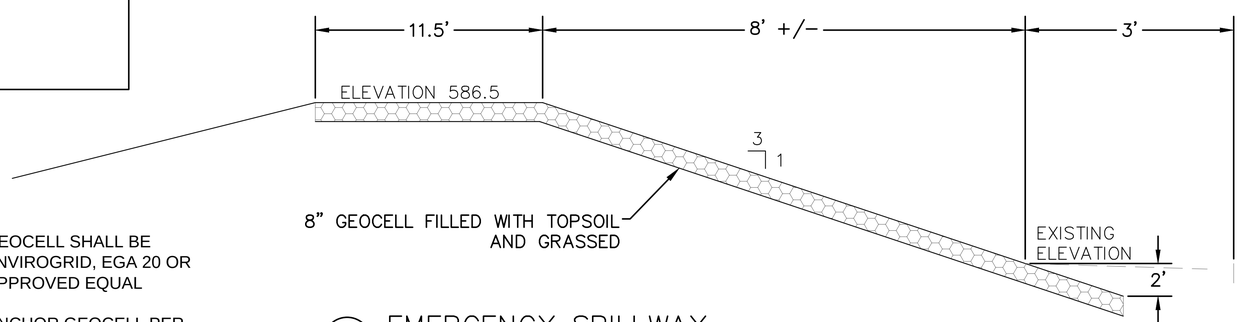
NOTES:
1. ADJUST EXISTING 3" BUMPER POSTS (NOT SHOWN) TO PROPOSED GRADE
2. SURVEY TOP OF WELL CASING AND PROVIDE ELEVATION ON AS-BUILT DRAWING

1 C02 MONITORING WELL CASING EXTENSION
NTS



B C02 SECTION
SCALE: 1"=20' HORIZ
1"=2' VERT





NOTES:
1. GEOCELL SHALL BE ENVIROGRID, EGA 20 OR APPROVED EQUAL
2. ANCHOR GEOCELL PER MANUFACTURER INSTALLATION PROCEDURE

2 C02 EMERGENCY SPILLWAY
NTS

LICENSED PROFESSIONAL ENGINEER
JENNIFER S. SEAMAN
062-062044
OF ILLINOIS
Exp. 11/30/21

NO.	DATE	REVISION	BY	APVD
DSGN	JAM	DR JAM	CHK RM	APVD SEALNAME

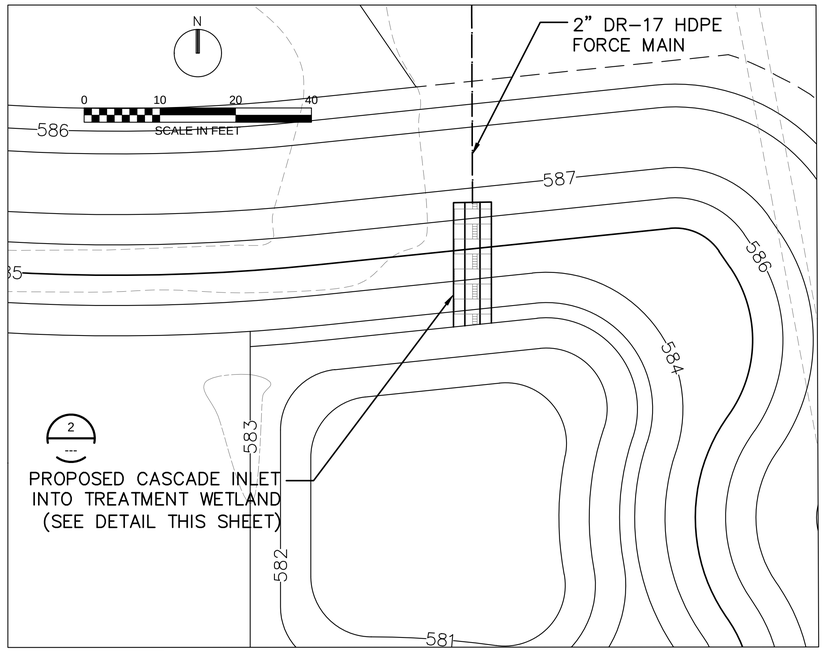
OMC WAUKEGAN HARBOR SITE, OPERABLE UNIT 1
WAUKEGAN, ILLINOIS
U.S. EPA REGION 5
CHICAGO, ILLINOIS

ch2m:

CIVIL
TREATMENT WETLAND SECTIONS AND DETAILS

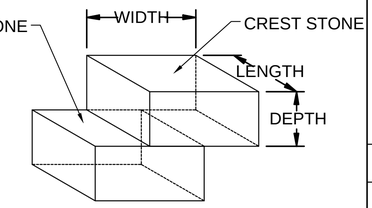
VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE	06/16/2020
PROJ	692199
DWG	C03
SHEET	06 of 12



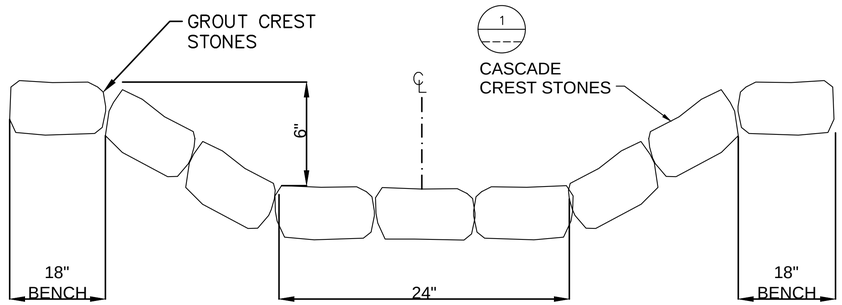
NOTES:

1. CREST STONES TO BE CHILTON OUTCROPPING STONES (DOLOMITIC LIMESTONE). WITH A RELATIVELY CONSISTENT COLOR FROM PALLET TO PALLET
2. CREST STONES AND FOOTER STONES ARE TO BE LARGE BOULDER OR FIELD STONES, GENERALLY RECTANGULAR, WITH SMALLEST AXIS APPROXIMATELY 1/2 OF LARGEST AXIS. ONE FLAT SURFACE IS NEEDED TO SET ON TOP OF FOOTER STONES.
3. CREST STONES SHALL BE PLACED TO SPAN SEAMS BETWEEN FOOTER STONES. CREST STONES, FOOTER STONES, AND VORTEX STONES DIMENSIONS SHALL BE AS SPECIFIED IN THIS DETAIL.

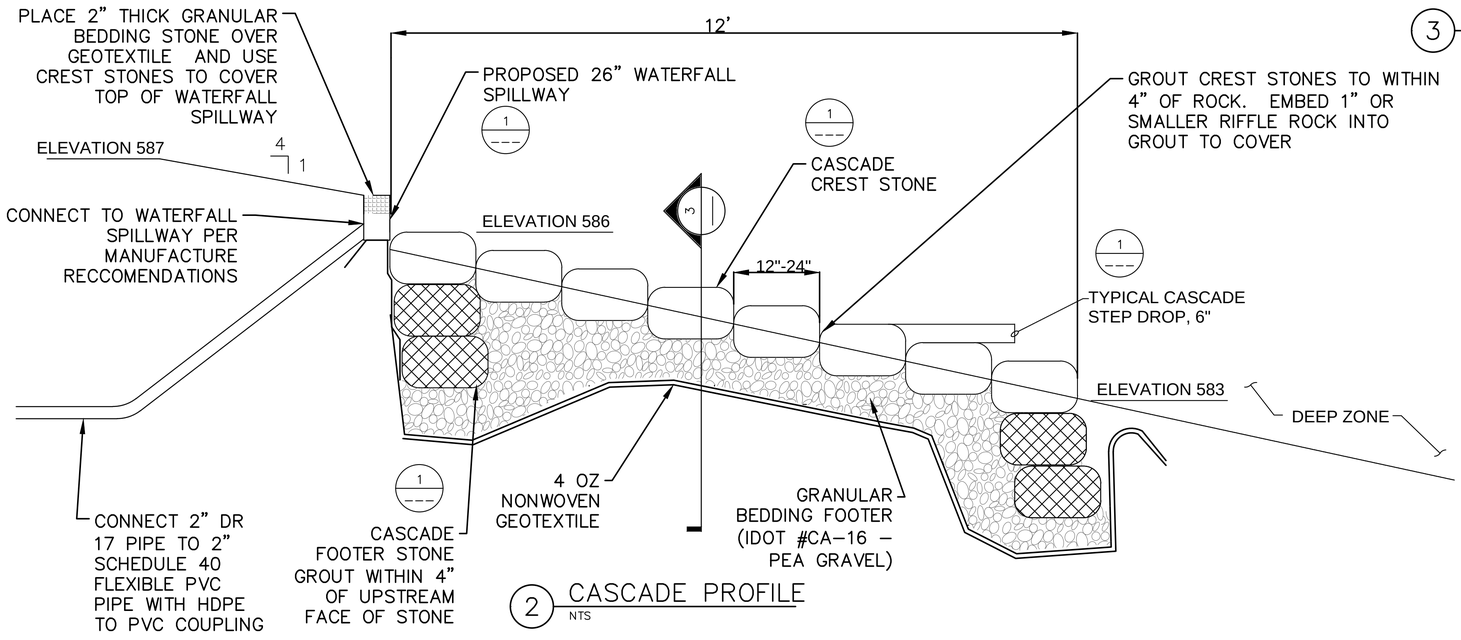


	TYPICAL	
DEPTH	8" MIN	
WIDTH	12" MIN	
LENGTH	24" MIN	

1 CREST STONES AND FOOTER STONES
NTS



3 TYPICAL CASCADE CROSS SECTION
NTS



2 CASCADE PROFILE
NTS

NOTES:

1. WATERFALL SPILLWAY TO BE 26" ATLANTIC FASTFALLS MODEL 110869 OR APPROVED EQUAL CAPABLE OF FLOWING 6,000 GPH MINIMUM.

4 CASCADE INLET REPRESENTATIVE PHOTO
NTS

LICENSED PROFESSIONAL ENGINEER
JENNIFER S. SEAMAN
062-062044
OF ILLINOIS
Exp 11/30/21

NO.	DATE	REVISION	BY	APVD
DSGN	JAM	DR	JAM	CHK	RM	APVD

SEALNAME

OMC WAUKEGAN HARBOR SITE.
OPERABLE UNIT 1
WAUKEGAN, ILLINOIS
U.S. EPA REGION 5
CHICAGO, ILLINOIS

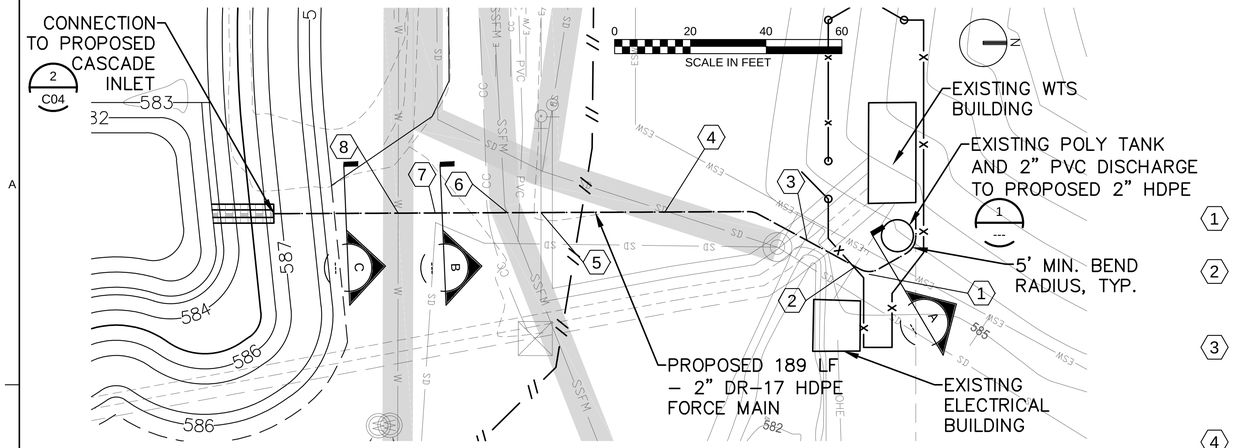
ch2m:

CIVIL

CASCADE INLET DETAILS

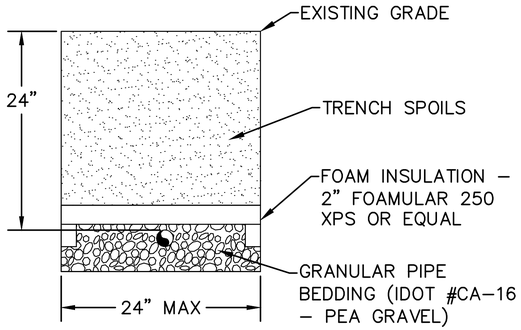
VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE	06/16/2020
PROJ	692199
DWG	C04
SHEET	07 of 12



UTILITY CONFLICT MATRIX

	UTILITY	ACTIVE / INACTIVE	CONFLICT TYPE	ESTIMATED CONFLICT ELEVATION	RESOLUTION
1	EXISTING SLURRY WALL & SEWER LINE	ACTIVE	HORIZONTAL		MAINTAIN 5' HORIZONTAL CLEARANCE FROM SEWER LINE AND 3' FROM SLURRY WALL
2	EXISTING ELECTRICAL CONDUIT	ACTIVE	VERTICAL	UNKNOWN	POTHOLE TO VERIFY UTILITY DEPTH AND LOCATION, MAINTAIN 6" VERTICAL SEPARATION
3	5 - 2" CONDUIT (ELECTRICAL, COMMUNICATION AND SEWER LINE	ACTIVE	VERTICAL	24" DEPTH	POTHOLE TO VERIFY UTILITY DEPTH AND LOCATION, MAINTAIN 6" VERTICAL SEPARATION
4	SEWER LINE	INACTIVE	VERTICAL	UNKNOWN	POTHOLE TO VERIFY UTILITY DEPTH AND LOCATION, MAINTAIN 6" VERTICAL SEPARATION OR REMOVE EXISTING PIPE SECTION AND CAP IN PLACE
5	4 - 2" CONDUIT (ELECTRICAL, COMMUNICATION AND SEWER LINE)	ACTIVE	VERTICAL	24" DEPTH	POTHOLE TO VERIFY UTILITY DEPTH AND LOCATION, MAINTAIN 6" VERTICAL SEPARATION
6	SEWER FORCE MAIN	INACTIVE	VERTICAL	UNKNOWN	POTHOLE TO VERIFY UTILITY DEPTH AND LOCATION, MAINTAIN 6" VERTICAL SEPARATION OR REMOVE EXISTING PIPE SECTION AND CAP IN PLACE
7	SEWER LINE	ACTIVE	HORIZONTAL	UNKNOWN	POTHOLE TO VERIFY UTILITY DEPTH AND LOCATION, MAINTAIN 18" VERTICAL SEPARATION
8	WATER LINE	INACTIVE	VERTICAL	UNKNOWN	POTHOLE TO VERIFY UTILITY DEPTH AND LOCATION, MAINTAIN 6" VERTICAL SEPARATION OR REMOVE EXISTING PIPE SECTION AND CAP IN PLACE

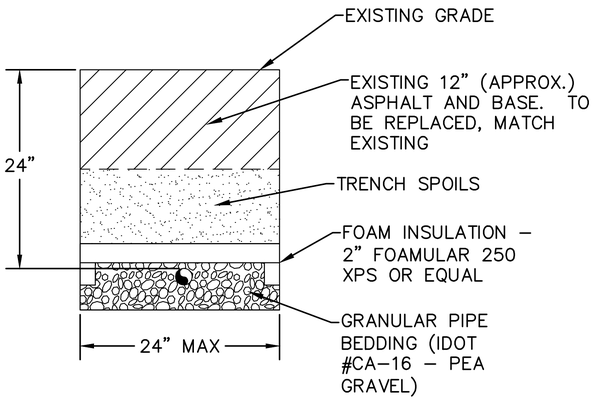


TYPICAL PIPE SECTION THROUGH VEGETATED AREAS

C — NTS

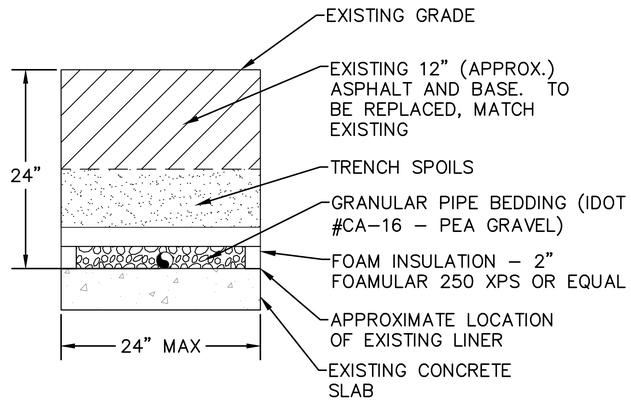
PIPE SECTION NOTES:

1. EXISTING SLURRY WALL IS APPROXIMATELY 3' WIDE
2. POT HOLE TO VERIFY SLURRY WALL CROSSING LOCATION. NOTIFY CONTRACTOR IF EXISTING LINER IS FOUND PRIOR TO LOCATING AN EXISTING CONCRETE SLAB. EXISTING LINER IS ASSUMED TO BE 30 MIL HDPE.
3. MAINTAIN 6" MINIMUM VERTICAL CLEARANCE FROM EXISTING ACTIVE UTILITIES SHOWN
4. EXISTING CONDUIT LINES ARE COVERED BY INSULATION, PROTECT IN PLACE DURING CONSTRUCTION
5. VERIFY PIPING AND CONDUIT ROUTE IN FIELD. PIPING AND CONDUIT ROUTE ENCOUNTERS VARIOUS INACTIVE AND ACTIVE UTILITIES. AFTER POTHOLING TO VERIFY ELEVATION OF EXISTING UTILITIES, COORDINATE WITH CONTRACTOR TO CONFIRM CONFLICT RESOLUTIONS



TYPICAL PIPE SECTION THROUGH PAVED AREAS

B — NTS



TYPICAL PIPE SECTION OVER SLURRY WALL

B — NTS

PIPE CONNECTION DETAIL

1 — NTS

PROFESSIONAL ENGINEER — LICENSED — JENNIFER S. SEAMAN 062-062044 — STATE OF ILLINOIS — Exp. 11/30/21

NO.	DATE	REVISION	DSGN	DR	CHK	APVD	BY	APVD
			JAM	JAM	RM			SEALNAME

OMC WAUKEGAN HARBOR SITE.
OPERABLE UNIT 1
WAUKEGAN, ILLINOIS
U.S. EPA REGION 5
CHICAGO, ILLINOIS

ch2m:

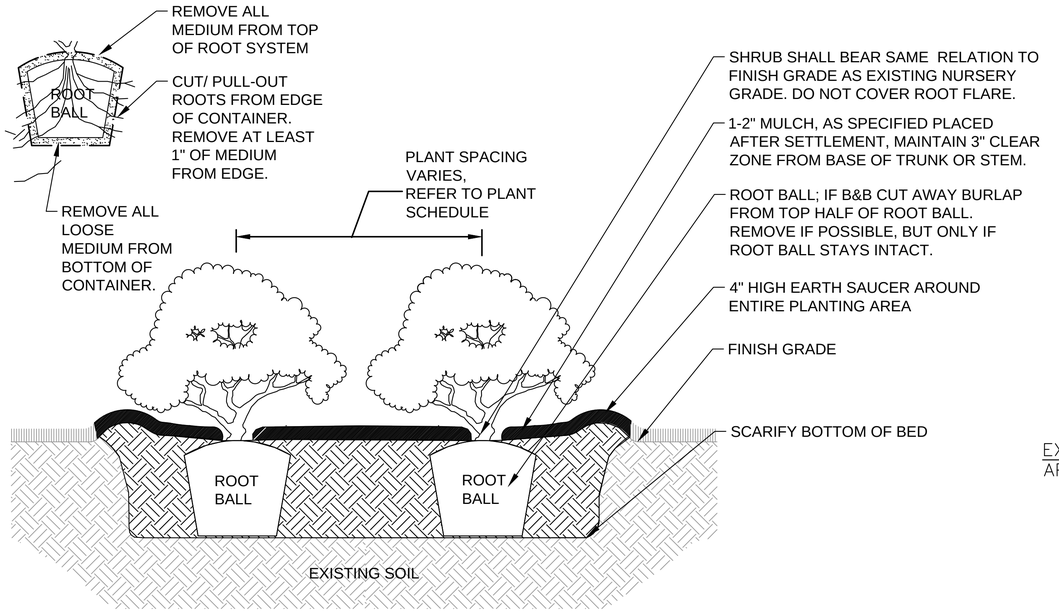
CIVIL

TREATMENT WETLAND PIPING SECTIONS & DETAILS

VERIFY SCALE

BAR IS ONE INCH ON ORIGINAL DRAWING. 0 1"

DATE	06/16/2020
PROJ	692199
DWG	C05
SHEET	08 of 12



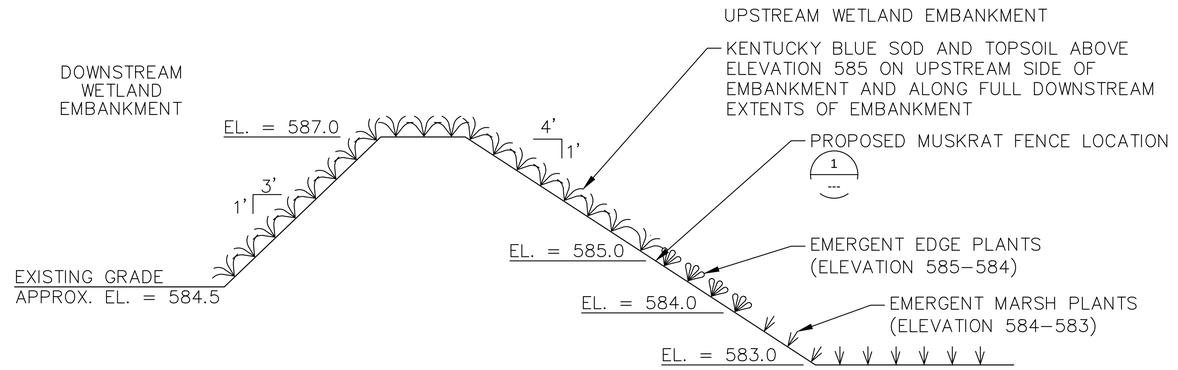
SHRUB PLANTING DETAIL

NTS

GENERAL NOTES:

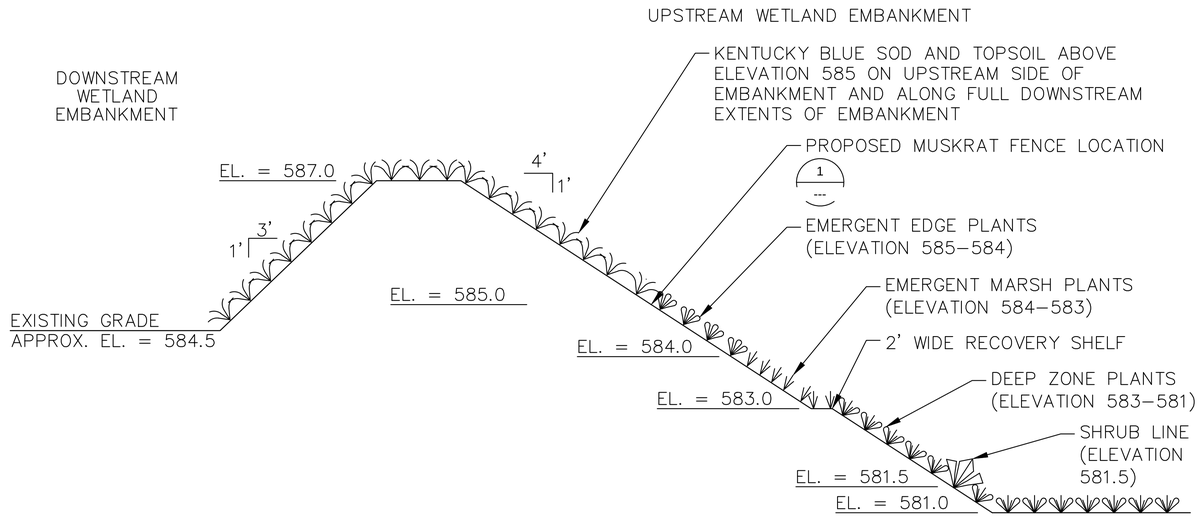
1. SEPARATE AND SPREAD OUT CONTAINER BOUND ROOTS, IF APPLICABLE. PULL ON ROOTS BY HAND OR SAW OUTER EDGE IN ORDER TO REMOVE 1-INCH OF PLANT MATERIAL FROM ALL SIDES. REMOVE ALL LOOSE MEDIUM FROM BOTTOM OF CONTAINER AND FROM TOP OF ROOT SYSTEM.

2. IF SHRUB IS B&B, CUT AWAY BURLAP FROM TOP HALF OF ROOT BALL. REMOVE IF POSSIBLE BUT ONLY IF ROOT BALL STAYS INTACT.



A TYPICAL EMERGENT ZONE PLANTING SECTION

NTS



B TYPICAL DEEP ZONE PLANTING SECTION

NTS

NO.	DATE	REVISION	BY	APVD
DSGN	JAM	DR	JAM	CHK	JAM	APVD	SEALNAME

OMC WAUKEGAN HARBOR SITE, OPERABLE UNIT 1
WAUKEGAN, ILLINOIS
U.S. EPA REGION 5
CHICAGO, ILLINOIS

ch2m:

CIVIL

TREATMENT WETLAND PLANTING SECTIONS & DETAILS

VERIFY SCALE

BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE	06/16/2020
PROJ	692199
DWG	P01
SHEET	09 of 12

PLANT SCHEDULE

SYMBOL	PLANT ABBR.	QUANTITY	BOTANICAL NAME	COMMON NAME	SPACING	SIZE
SHRUBS						
⊙	CO	28	Cephalanthus Occidentalis	COMMON BUTTONBUSH	AS SHOWN	GALLON

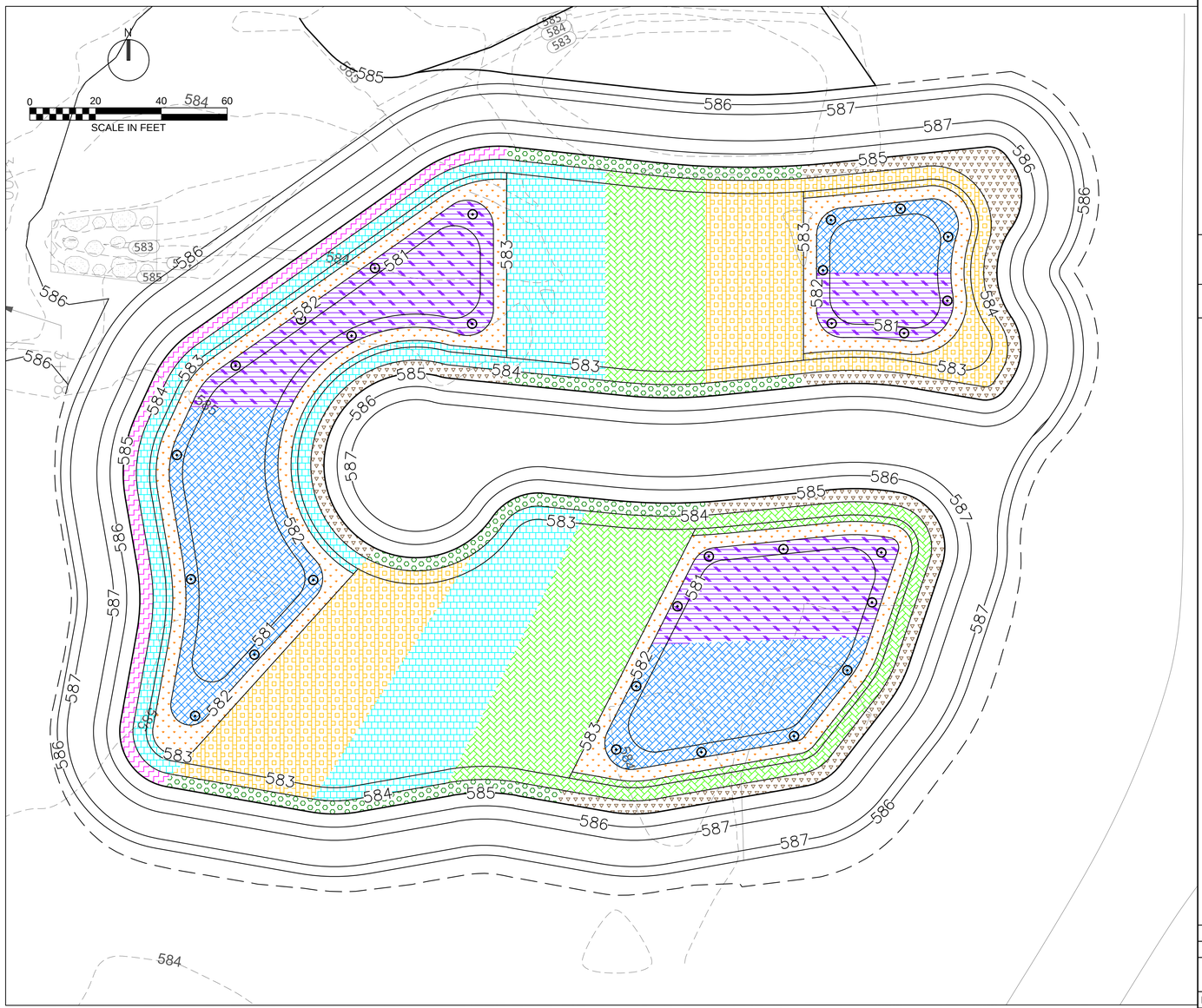
DEEP ZONE PLANTS (PLANT IN GROUPS OF 6 AT 3' ON CENTER)			
BOTANICAL NAME	COMMON NAME	QTY	SYMBOL
Nuphar Advena	YELLOW POND LILY	670	
Nymphaea Odorata	WHITE WATER LILY	546	
Schoenoplectus Acutus	HARD-STEMMED BULRUSH	433	

EMERGENT EDGE PLANTS (BARE ROOT PLUGS AT 2.0' ON CENTER)			
BOTANICAL NAME	COMMON NAME	QTY	SYMBOL
Spartina Pectinata	PRAIRIE CORDGRASS	411	
Juncus Effusus	COMMON RUSH	260	
Sparganium Eurycarpum	COMMON BUR REED	585	

EMERGENT MARSH PLANTS (BARE ROOT PLUGS AT 2.0' ON CENTER)			
BOTANICAL NAME	COMMON NAME	QTY	SYMBOL
Schoenoplectus Tabernaemontani	SOFT-STEMMED BULRUSH	1,537	
Pontederia Cordata	PICKERELWEED	1,531	
Acorus Calamus	SWEET FLAG	1,416	

WETLAND PLANTING NOTES:

1. ADD A SINGLE PELLET OF 10-10-10 (N-P-K) CONTROLLED-RELEASE FERTILIZER TO THE BOTTOM OF EACH PLANT HOLE BEFORE INTRODUCING THE PLANT



LICENSED PROFESSIONAL ENGINEER
JENNIFER S. SEAMAN
062-062044
OF ILLINOIS
Exp. 11/30/21

NO.	DATE	REVISION	BY	APVD
DSGN	JAM	DR JAM CHK		APVD

SEALNAME

OMC WAUKEGAN HARBOR SITE.
OPERABLE UNIT 1
WAUKEGAN, ILLINOIS
U.S. EPA REGION 5
CHICAGO, ILLINOIS

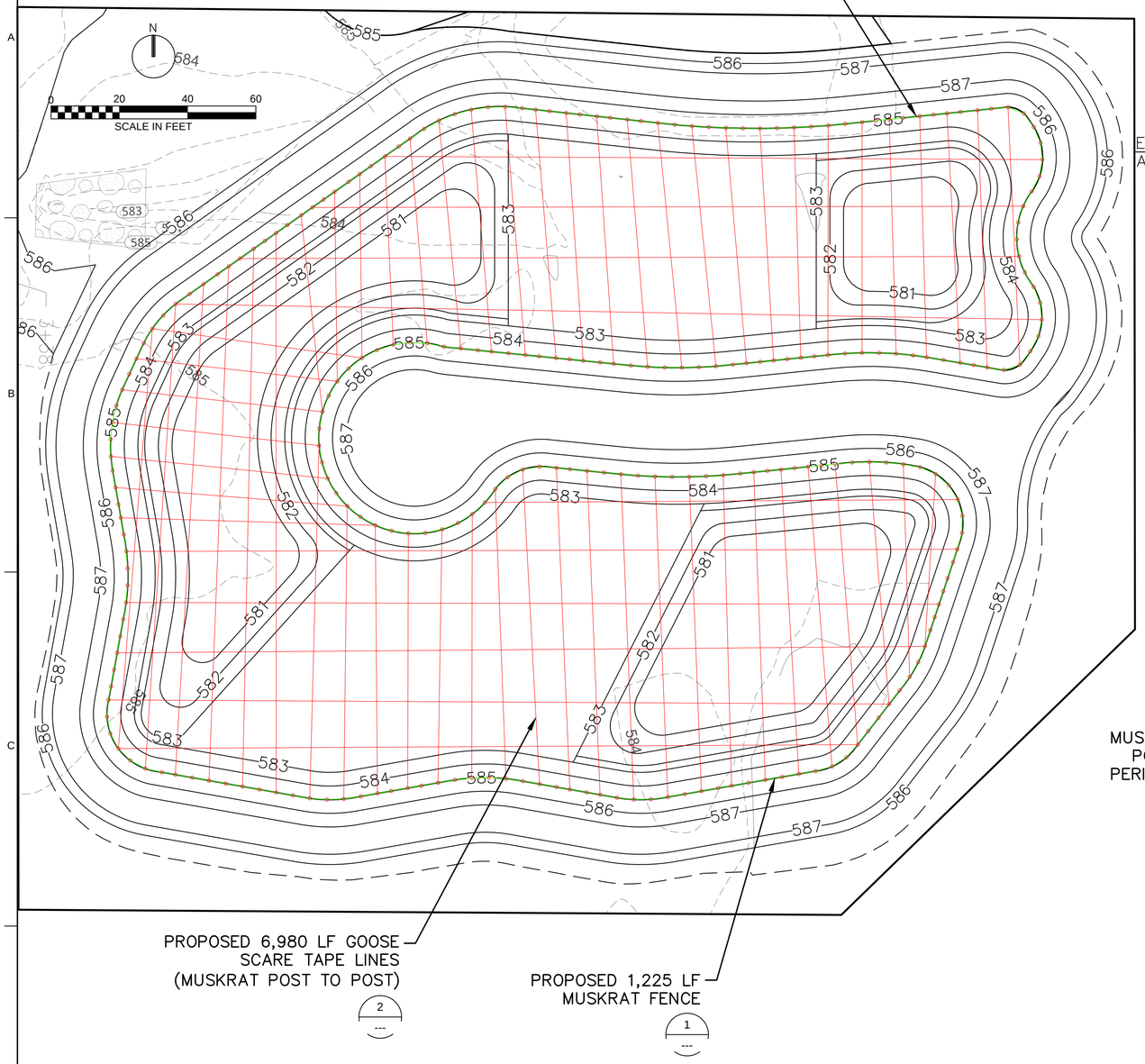
ch2m:

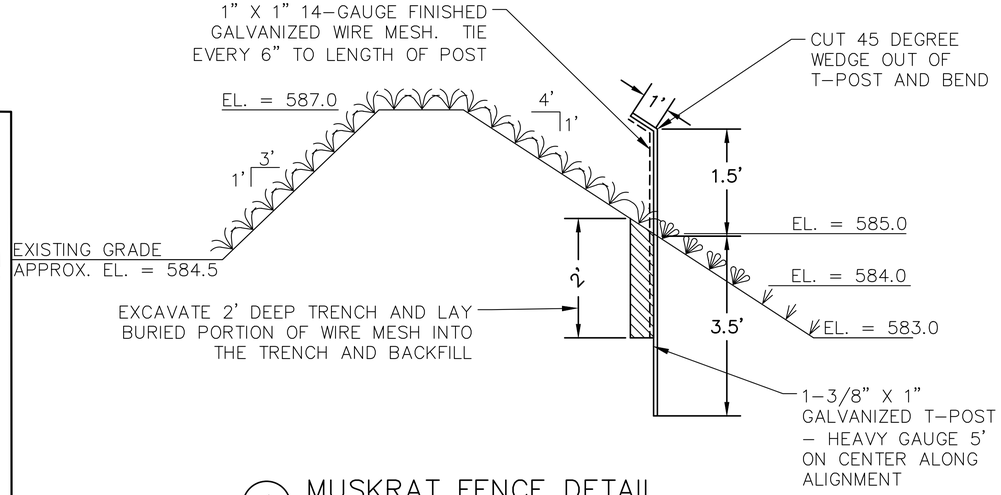
CIVIL

TREATMENT WETLAND PLANTING PLAN, SCHEDULE & DETAILS

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE	06/16/2020
PROJ	692199
DWG	P02
SHEET	10 of 12

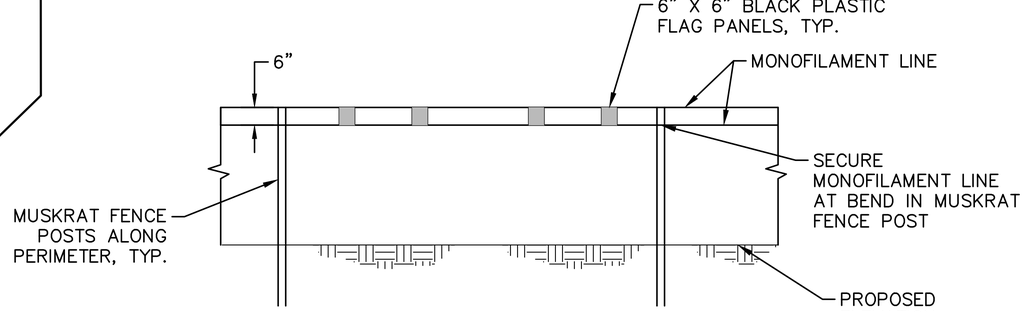




1 MUSKRAT FENCE DETAIL
NTS

NOTES:

1. FENCE WILL REQUIRE MUSKRAT PROOF GATE.



2 GOOSE SCARE TAPE DETAIL
NTS

NOTES:

1. INSTALL DIRECTLY AFTER COMPLETION OF WETLAND PLANTING AND LEAVE IN PLACE UNTIL ESTABLISHMENT OF VEGETATION (MIN. TWO GROWING SEASONS).
2. MONOFILAMENT LINE TO BE FASTENED SECURELY TO MUSKRAT FENCE POSTS WITH A KNOT AT THE BEND OF THE FENCE POST.
3. TOTAL QUANTITY BASED ON DISTANCE FROM POST TO POST, AND IS NOT INCLUSIVE OF INCIDENTAL LENGTH REQUIRED FOR FASTENING THE WIRES TO THE MUSKRAT FENCE POSTS. ACTUAL QUANTITY OF MONOFILAMENT LINE SHOULD INCLUDE BOTH THE TOP AND BOTTOM LINE PER LF LISTED ON THE QUANTITY.
4. 6"X6" BLACK PLASTIC FLAG PANELS HAVE A 1" WIDE FOLD AT THE TOP AND BOTTOM OF PANEL (ACTUAL SIZE 6"X8"). FOLDED ENDS WRAP AROUND THE TWO PARALLEL AERIAL MONOFILAMENT WIRES. THEY ARE ATTACHED VIA HEAT SEALING, CRIMPING, OR BY ADHESIVE.
5. BLACK PLASTIC FLAG PANELS EACH HAVE A HALF CIRCLE CUT AT THE CENTER WITH A 2" RADIUS. THIS IS TO BE DONE TO REDUCE WIND RESISTANCE.
6. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN DEBRIS COLLECTS ON THE FENCE THROUGH THE DURATION ON INSTALLATION.

LICENSED PROFESSIONAL ENGINEER
JENNIFER S. SEAMAN
062-062044
OF ILLINOIS
Exp. 11/30/21

NO.	DATE	DSGN	DR	CHK	APVD	BY	APVD
		JAM	JAM	JAM			

REVISION

SEALNAME

OMC WAUKEGAN HARBOR SITE,
OPERABLE UNIT 1
WAUKEGAN, ILLINOIS
U.S. EPA REGION 5
CHICAGO, ILLINOIS

ch2m:

CIVIL

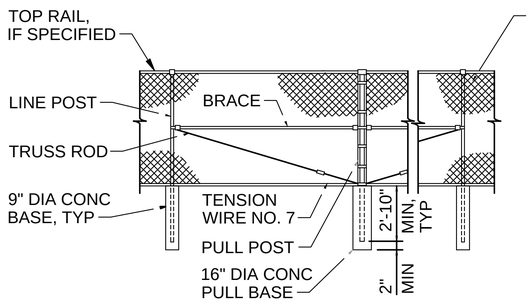
TREATMENT WETLAND PLANTING DETAILS

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE	06/16/2020
PROJ	692199
DWG	P03
SHEET	11 of 12

LINE POST CONNECTION

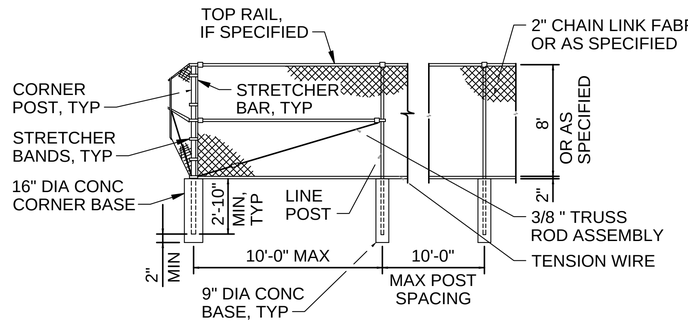
TOP RAIL CONNECTION



NOTES:

1. BRACE AND TRUSS ROD REQUIRED AT GATES AND SIDE OF ALL CORNER POSTS.
2. FABRIC ATTACHED TO OUTSIDE OF POSTS.

TYPICAL PULL POST



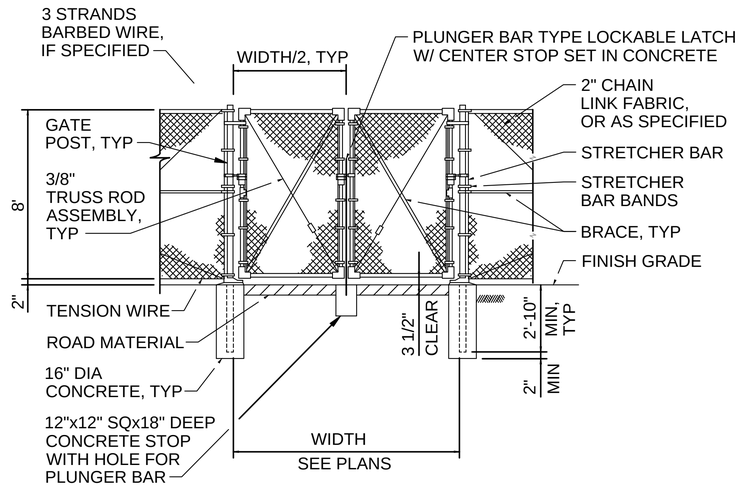
TYPICAL CORNER POST

CHAIN LINK FENCE

3231-410

NTS

NOTE:
1. SUPPLY PRIVACY SLATS FOR ALL FENCE LENGTH

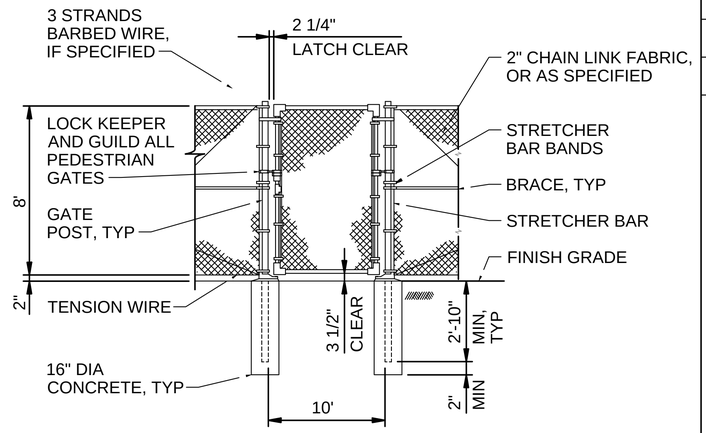


DOUBLE SWING GATE

3231-415

NTS

NOTE:
1. SUPPLY PRIVACY SLATS FOR ALL FENCE LENGTH



PEDESTRIAN GATE

3231-420

NTS

NOTE:
1. SUPPLY PRIVACY SLATS FOR ALL FENCE LENGTH

NO.	DATE	DSGN	REVISION	CHK	BY	APVD
		JAM		JAM	DR	APVD
				RM		SEALNAME

OMC WAUKEGAN HARBOR SITE,
OPERABLE UNIT 1
WAUKEGAN, ILLINOIS
U.S. EPA REGION 5
CHICAGO, ILLINOIS

ch2m:

CIVIL

PROJECT DETAILS

VERIFY SCALE

BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE	06/16/2020
PROJ	692199
DWG	D01
SHEET	12 of 12

Appendix C
Water Treatment System Operations and Maintenance

Appendix C-1
H2K O&M Manual

OPERATIONS AND MAINTENANCE PLAN
REMEDIAL CONSTRUCTION ACTIVITIES
WATER TREATMENT SYSTEM
WAUKEGAN, ILLINOIS

Water Treatment System O&M

7550 Commerce Street
Corcoran, MN 55340
Phone: 763-746-9900
Fax: 763-746-9903
www.H2Ktech.com

OPERATION & MAINTENANCE MANUAL

For

Arrowhead Contracting, Inc.

Water Treatment System
OMC Waukegan Harbor
Waukegan. IL

H2K Technologies Inc., Project Number #4221

Supplied By

H2K Technologies Inc.
7550 Commerce St.
Corcoran, MN 55340
(763) 746-9900

TABLE OF CONTENTS

Warranty Terms & Conditions

WARRANTIES: We warrant performance against defects in workmanship for a period of twelve (12) months from date of shipment. We also agree to pass on to the Purchaser any extended warranties by the manufacturer for material supplied. Remedies are limited to the repair and/or replacement of the defective part at H2K Technologies Plant in Plymouth, MN, and do not included freight to and from the point of operation or onsite labor to install or remove the product for service. It is agreed that any action for breach of express or implied warranty shall be initiated within fifteen (15) months of the date of shipment and only those defects that are documented to have occurred within twelve (12) months of shipment will be covered by the warranty. In no event shall H2K Technologies be liable for unintended or consequential damages, including, but not limited to, loss of profits or use damages arising out of the manufacture sale or supplying of the product. The provisions of the warranty are in lieu of any other warranty, whether expressed or implied, written or oral, and H2K Technologies liability arising out of the manufacture, sale or supplying of the product and its use, whether based on warranty, contract, negligence, product liability or otherwise shall not exceed the original cost of the defective product.

Section 1. System / Equipment Description

This manual contains important information about the equipment H2K Technologies, Inc has supplied for this project. Specific operation and maintenance information for individual components or systems can be found in the numbered sections. If additional information is required, please call 763-746-9900.

The appendices contain the original equipment manufacturers' operation and maintenance manuals, specification sheets, modeling, etc.

Equipment Description:

The below is a list of equipment supplied by H2K Technologies Inc. for this project, more specific information on most of these items can be found in numbered sections of the manual.

Inlet manifold, including:
- 2" header with (3) 2" takeoffs, schedule 80 PVC piping & fittings
- (6) 1 1/2" PVC or brass gate valve
- (4) 1 ½" Magnetic flow meter with indicator/transmitter, Endress Hauser promag 50P mag meter, 4-20 mADC out, model 50P40-EL0A1AA0BBAA
- (1) 1 ½" flow control valve, electric modulating actuator, ball valve,120 VAC

(1) Influent Pump Tank
- 550 gallon HDPE free standing vertical tank, Norwesco model 40023
- 67" diameter x 44" high, 16" manway
- Inlet and outlet threaded bungs
- Vented to outside of building
- (1) Siemens Multi-Ranger unltrsonic level transmitter, 4-20 mADC output Model 100 with XPS-10F element

(1) Influent Pump, Paco model 15951F
- 50 gpm @ 50' TDH
- Cast iron with ductile iron impeller
- 2 HP, 230VAC, 1Ø, TEFC motor
- Isolation ball valve on inlet
- Check valve on pump discharge
- Sample port on pump discharge
- Pressure gage on pump discharge, ss, liquid filled

(1) Cartridge filter housing Siemens model ZHGOF0620 Cartridge filter housing with (6) 20" cartridges, and the following:
- (1) Siemens model ZHGOF0620 multi-cartridge filter housings
  - 316 SS construction, 150 psi, swing bolt closure lid
  - Unit houses (6) 20" catridges
  - 2" NPT inlet and outlet connections
  - 5 micron polypropylene filter cartridges
- (1) DP transmitter across filter housing, Rosemount 3051 CD3A22A1AS5B4M4D4

(2) Siemens model PV-1000 Liquid Phase carbon vessels
- Carbon steel construction, 90 psi design pressure
- Epoxy resin lining, epoxy/urethane exterior finish
- Fork tubes, lifting lugs
- 1,000 lbs 8x30 mesh reactivated carbon in each vessel
- 3" influent and effluent NPT connections
- PVC hub and lateral internals
- ¼" and 3/4" Air bleed valve with galvanized piping on top of vessel
- (2) 11"x16" manways
- 1" drain valve with galvanized piping
- 4-70 gpm flow range
- Isolation valve on inlet and outlet of each vessel
- Pressure gage and sample port on inlet and outlet of each vessel

(1) Header for series lead/lag and backwash operation of two vessels
- PVC schedule 80 PVC pipe and fittings
- (10) 2" PVC true union ball valves
- Pressure gage on inlet/outlet of each vessel
- Stand as required
- (2) DP transmitters, (1) across each LGAC vessel, Rosemount 3051 CD3A22A1AS5B4M4D4

(1) 1 ½" Effluent Magnetic flow meter with indicator/transmitter, Endress Hauser promag 50P mag meter, 4-20 mADC out, model 50P40-EL0A1AA0BBAA

(1) Building Sump Pump, Goulds model WE0511HH submersible sump pumps
- 10 gpm at 50' TDH
- Cast iron case and volute, and impeller
- 1/2 HP, 120VAC, 1Ø, sealed motor with local float switch for pump control
- Check valve, isolation ball valve on each pump discharge

(1) Diffused Aerator Chamber, H2K DTA1
- Stainless Steel chamber and connections
- 2" NTP influent and effluent
- 3/4" drain valves
- 2" PVC sump level sight glass

(1) DTA Blower, Rotron DR 513R58
- Cast aluminum housing
- Inline filter
- 1.5 hp
- 220 VAC single phase

(1) Metering Pump, Grundfos DDA
- Adjustable flow control
- Self priming
- Graphic LC display

Enclosure

(1) H2K Welded steel building, 11' wide x 25' long x 10'6" high (outside dimensions)
- Fully insulated steel building (non combustible design)
- 14 gage sheet steel exterior with Epoxy/urethane exterior finish
- Painted steel sheets on inside of building
- Steel skid with industrial enamel coated, 3/16" sheet steel floor
- 6" structural I-beam floor supports 24" on center, to allow large loading
- 6" structural I-beam skid framing members, Anchor lugs and lifting eyes
- 9" high internal floor spill containment or as required
- Floor boxes and wall sleeves for incoming and outgoing lines as needed
- Anchor lugs and lifting eyes
- Floor sump with high level switch
- 550 Gallon floor containment with galvanized steel grating
- 25 gallon sump
- (2) Incandescent light with vapor globe and wall switch
  Exterior light with photocell, interior emergency battery light – Lithonia model ELM2LED
- (1) Vent fan with inlet and outlet insulated gravity louvers and thermostat
- Insect screens and filter on inlet louver
- (3)GFI outlet (2 on inside, 1 on outside)
- (2) 3 kW electric fan driven wall mounted heaters with thermostat
- Single 36" x6' 8" access door insulated steel with key lock
- (2) Double 36" x 6' 8" access doors, insulated steel with key lock
- (1) Door intrusion alarm Edwards signaling model 151-6Z-06K
- (1) 2' x 3' x 6' high extra heavy duty steel shelving with (4) adjustable shelves
- (1) 10 lb ABC dry chemical fire extinguisher, wall mounted, with heavy duty bracket
- (1) First Aid kit, 223-U/FAO
- (1) Blood born pathogen kit Safeware model CER200-906

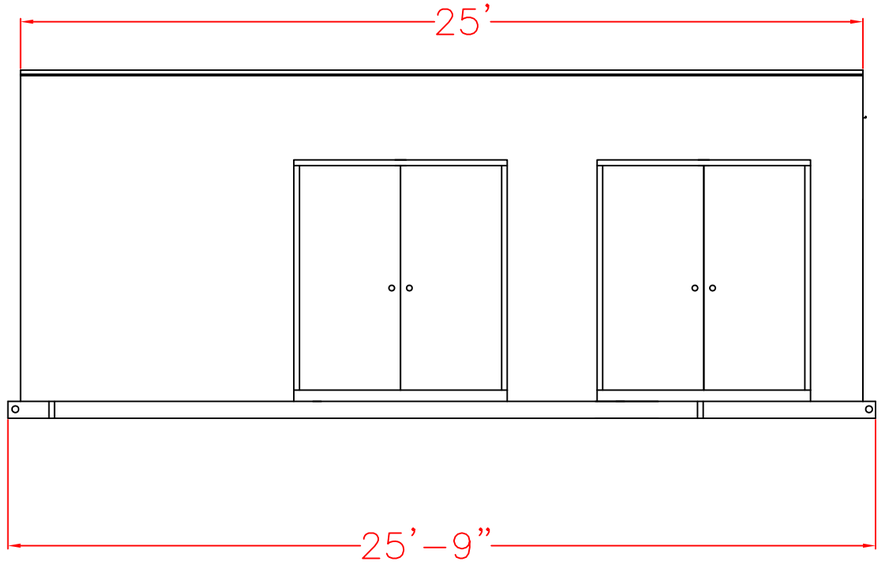
GWTS and control panel is mounted, piped and wired inside of building. Piping is schedule 80 PVC. Wiring is per NEC for a non-classified environment inside and outside of the enclosure.

Equipment List

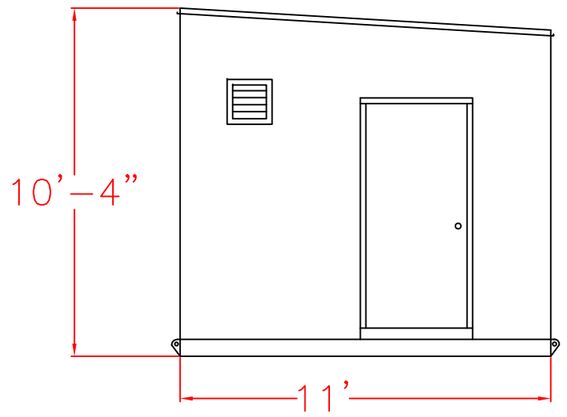
Equipment	Manufacturer	Model Number	Description
Influent Tank	Norwesco	40023	550 gallon, HDPE
Influent Pump	Paco	15951F	50 gpm @ 50’ TDH, 2 HP, 230 VAC, 1 phase, TEFC
Cartridge Filter Housing	Evoqua	ZHGOF0620	316 SS construction, 150 psi, holds (6) 20” cartridges
Cartridge Filters	Evoqua	W2T159701, 20”, 5 micron, PP	20” cartridge, 5 micron, polypropylene
Carbon Filters	Evoqua	PV1000	Carbon steel, 90 psi construction, 1000 lbs 8x30R carbon
Building Sump Pump	Goulds	WE0511HH	10 gpm @ 50’ TDH, ½ HP, 120 VAC, 1 phase
Diffused Aerator Chamber	H2K Tech	DTA 1	304 SS, 2” NPT inlet and outlet, high alarm level switch
Blower	Rotron	DR 513R58	1.5 hp, 220 VAC single phase
Metering Pump	Grundfos	DDA	Programmable variable dosing

Section 2. Mechanical Drawings:

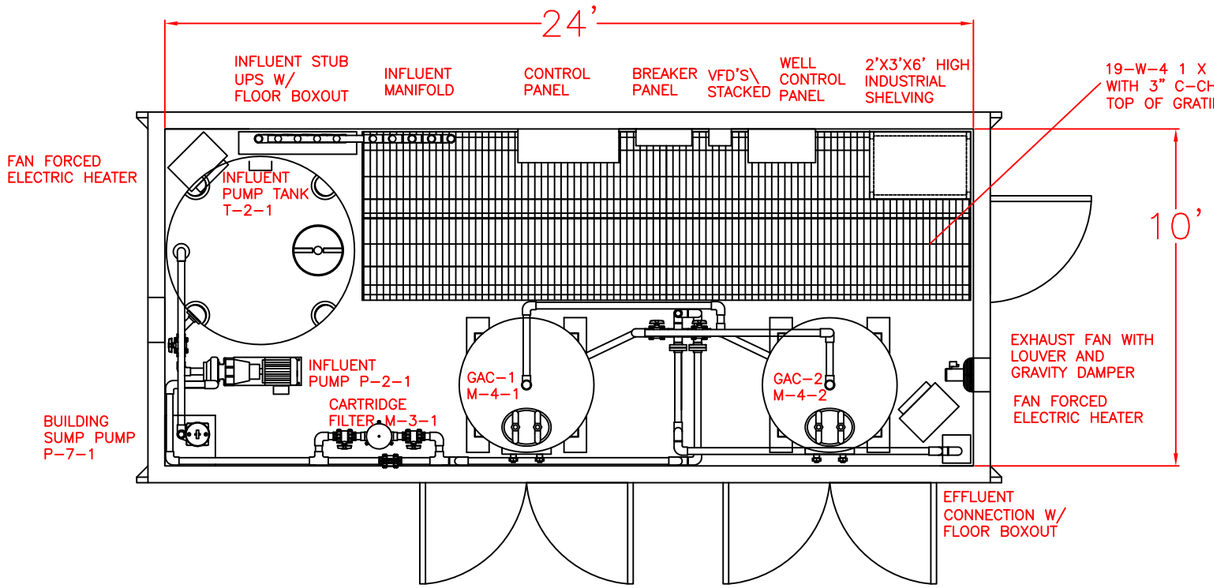
Contains any H2K Technologies Inc. generated drawings



FRONT VIEW



RIGHT SIDE VIEW



PLAN VIEW

NOTES:
1. FLOOR HAS 4” CONTAINMENT LIP FOR 590 GALLON VOLUME.
2. FLOORING IS DESIGNED FOR 500 PSF LIVE LOAD WHEN SET ON A CONCRETE PAD AND A 2500 LB CONCENTRATED LOAD.
3. SHIPPING WEIGHT: APPROX 24,500 LBS, OPERATING WEIGHT 38,000 LBS.
4. DESIGN CONDITIONS: WAUKEGAN, IL
   WIND LOAD: 90 MPH EXP B
   SNOW LOAD: 50 PSF GROUND SNOW LOAD/35 PSF ROOF
   SEISMIC: DESIGN CAT. A

REVISIONS

REV	DESCRIPTION	DATE	DWN
A	CHANGES PER SUBMITTAL REVIEW	5/14	MK

UNLESS SPECIFIED OTHERWISE
* DIMENSIONS ARE IN INCHES
* DO NOT SCALE DRAWING

DRAWN BY: MK
DESIGNED BY: GH
PROJECT MGR.: MK
DATE: 5/1/2014
PROJECT NO.: 4221

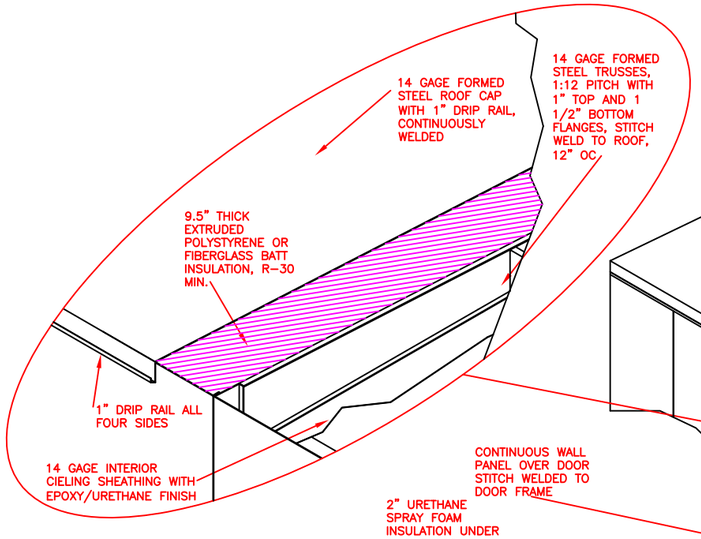
H2K Technologies, Inc.
7550 Commerce St, Corcoran, MN 55340, Tel: 763–746–9900

PROJECT TITLE:
OMC WAUKEGAN HARBOR
WAUKEGAN, IL
ARROWHEAD CONTRACTING

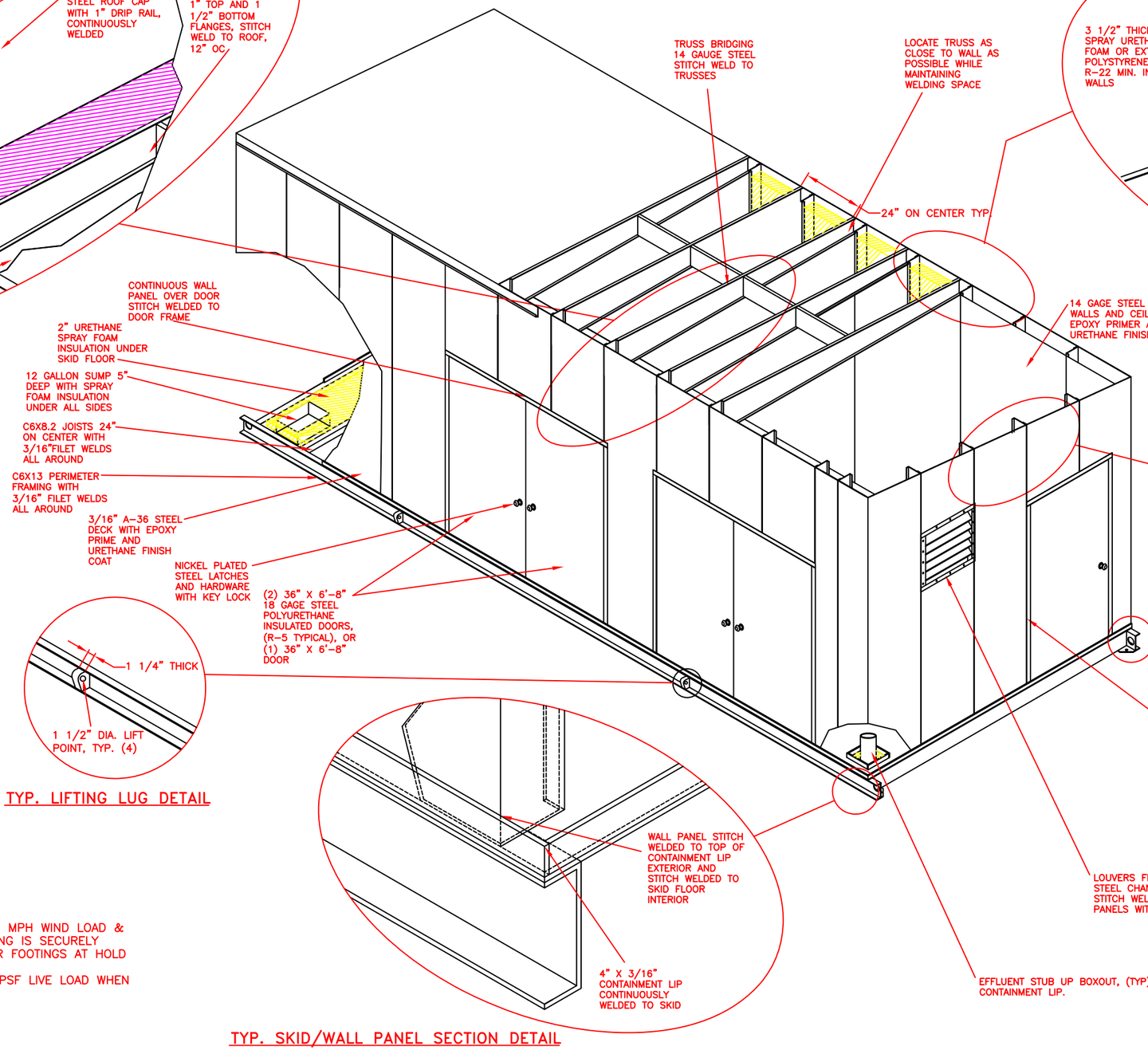
DRAWING TITLE:
WATER TREATMENT SYSTEM
PLOT & ELEVATION DRAWING

SHEET 1 OF 1

DRAWING NO.:
4221–01

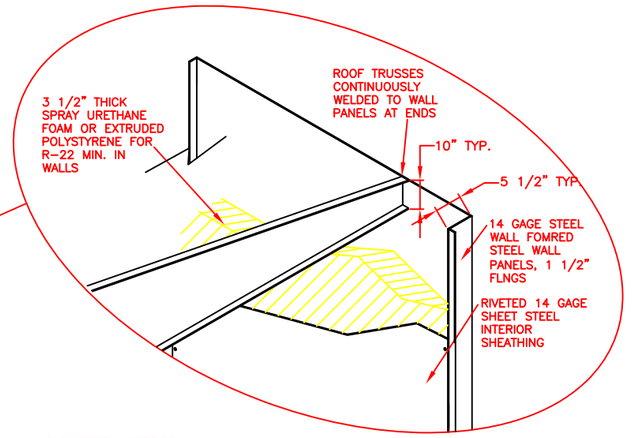


TYP. ROOF JOIST DETAIL

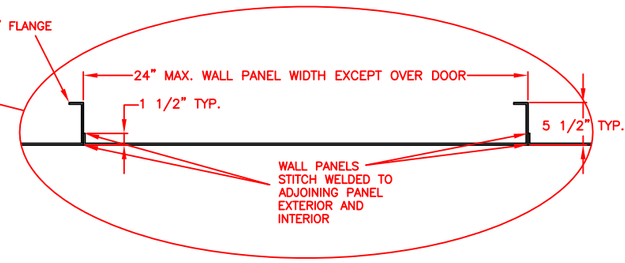


TYP. LIFTING LUG DETAIL

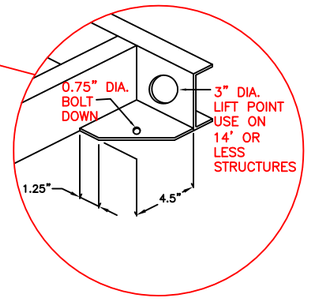
TYP. SKID/WALL PANEL SECTION DETAIL



TYP. WALL PANEL DETAIL



TYP. WALL PANEL SECTION DETAIL



TYP. CORNER BOLT DOWN DETAIL

SPECIFICATIONS:
1. BUILDING DESIGNED FOR A 120 MPH WIND LOAD & 50 PSF SNOW LOAD WHEN BUILDING IS SECURELY ANCHORED TO CONCRETE SLAB OR FOOTINGS AT HOLD DOWN LUGS.
2. FLOORING DESIGNED FOR 500 PSF LIVE LOAD WHEN PLACED ON CONCRETE SLAB.

REVISIONS

REV	DESCRIPTION	DATE	DWN
A	ADDED SNOW GUARD, CONFIGURED DOORS, LOUVER	4/16	GH
B	ROOF TO SINGLE SLOPE, STEEL SHEATHING INTER.	5/16	GH

UNLESS SPECIFIED OTHERWISE
* DIMENSIONS ARE IN INCHES
* DO NOT SCALE DRAWING

DRAWN BY: MK
DESIGNED BY: GH
PROJECT MGR.: MH
DATE: 11/30/11
PROJECT NO.: 3522

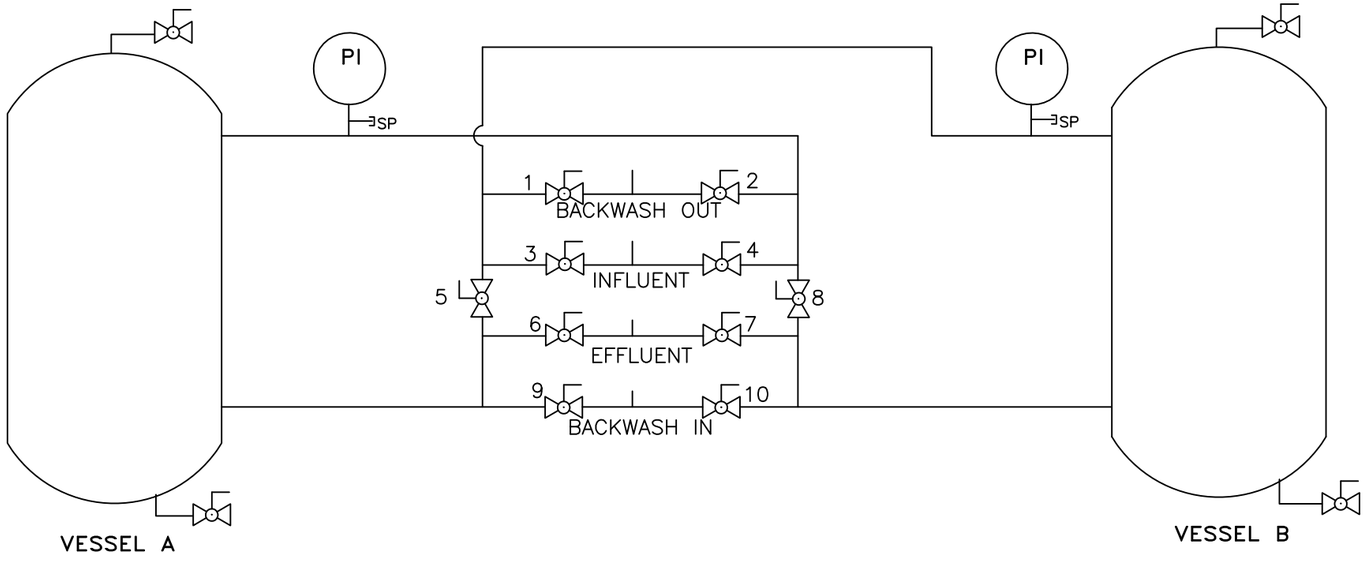
H2K Technologies, Inc.
7550 Commerce St, Corcoran, MN 55340, Tel: 763-746-9900©2011

PROJECT TITLE:
OMC WAUKEGAN HARBOR
WAUKEGAN, IL
ARROWHEAD CONTRACTING

DRAWING TITLE:
WELDED STEEL ENCLOSURE
ISOMETRIC CONSTRUCTION
DETAIL DRAWING

SHEET 1 OF 1

DRAWING NO.:
4221-02



OPERATION	OPEN VALVES	CLOSED VALVES
OPERATE VESSEL A ONLY	4,6	1,2,3,5,7,8,9,10
OPERATE VESSEL B ONLY	3,7	1,2,4,5,6,8,9,10
OPERATE SERIES A TO B	4,5,7	1,2,3,6,8,9,10
OPERATE SERIES B TO A	3,6,8	1,2,4,5,7,9,10
OPERATE PARALLEL	3,4,6,7	1,2,5,8,9,10
OPERATE VESSEL A BACKWASH B WITH BW PUMP	1,4,6,10	2,3,5,7,8,9
OPERATE VESSEL B BACKWASH A WITH BW PUMP	2,3,7,9	1,4,5,6,8,10

REVISIONS

REV	DESCRIPTION	DATE	DWN

UNLESS SPECIFIED OTHERWISE
* DIMENSIONS ARE IN INCHES
* DO NOT SCALE DRAWING

DRAWN BY: MK
DESIGNED BY: MK
PROJECT MGR.: MK
DATE: 2/24/04
PROJECT NO.: standard product

H2K Technologies, Inc.
9851 13th Ave N., Plymouth, MN 55441, Tel: 763-746-9900 ©2003

PROJECT TITLE:
OPERATION SCHEMATIC

DRAWING TITLE:
CARBON VESSELS & HEADER P&ID OPERATION

SHEET 1 OF 1

DRAWING NO.:
O&M

Section 3. Control Panel Schematic & Description:

Contains the control panel schematic, operation description of the control system and alarm schedule.

Control Panel

A 1 NEMA 1/12 Painted Steel, control panel for operation on 120 VAC service. To control 2 ODC Containment cell extraction well pumps via VFD, two existing West PCB containment cell extraction well pumps via motor starter, one Consolidation Facility (CF) pump, one influent pump, and one sump pump powered from separate panelboard and motor starters located next to control panel. To include:

QTY	DESCRIPTION
1	Enclosure, NEMA 4 Painted Steel 60"h, 36"w, 8"d with padlockable handle, OIT and operator devices mounted on outer door, and sub panel for system components
A/R	Circuit breakers; miniature 120V (.5-25); misc loads as required
2	24VDC power supply, 60W, 2.6A, DIN rail mount
1	Allen-Bradley 1756-L71 ControlLogix PLC with 1756-PA75 power supply and 13 slot chassis
1	Allen-Bradley 1756-ENBT Ethernet module
2	Allen-Bradley 1756-IF16 Analog input card
1	Allen-Bradley 1756-OF8 Analog output card
2	Allen-Bradley 1756-IA16 Discrete input card
1	Allen-Bradley 1756-OA16 Relay output card
1	Allen-Bradley Panelview Plus 6 1500 color touchscreen operator interface
1	Uninterruptable power supply (UPS); 1000 VA Din rail mounted
1	5-port Ethernet switch
1	Modem; Cellular; for remote access to OIT, PLC (Spectrum Webport)
1	Duplex outlet with outlet box and cover plate; UPS
7	Switch; 3-Position; On-Off-Remote with integral Green “run” light: pumps
1	Switch; 3-Position; On-Off-Auto with integral Green “run” light: building vent fan
A/R	Relay and plug-in base
A/R	Analog instrument surge suppression for signals outside building
	Each I/O channel separately fused via fused terminal blocks
	All outputs wired to interposing relays (including spare/unused outputs)
	All spare/unused I/O wired to terminal blocks
	Serialized UL508A label
	Engraved laminated legends for all door mounted devices
	DIN rail component mounting; wire duct wire routing system
	Color-coded wiring with wire markers at all terminations
	AutoCAD documentation (load table calculation, schematic wiring diagram)
	Assembled, wired and pre-shipment test

Panelboard

B 1 NEMA 1 Panelboard 120/240VAC 1phase in NEMA 1 enclosure mounted next to control panel on building interior wall. To include:

1	Circuit breaker; 240V 2P150A; Main
2	Circuit breaker; 240V 2P15A 10k; Well Pumps (non VFD existing wells)
2	Circuit breaker; 240V 2P15A 10k; Well Pumps (VFD)
2	Circuit breaker; 240V 2P30A 10K; pumps
2	Circuit breaker; 240V 1P15A GFCI 10K; heat trace
1	Circuit breaker 120V 1P10A 10K; control power
4	Circuit breaker 120 V 1P20A 10K; outlet, vent fan, lights, sump pump
2	Circuit breaker 240V 2P20A 10K; building heaters
1	Circuit breaker 240V1P20A 10K, DTA blower
1	Circuit breaker 120V 1P 10A 10K, Meter pump

VFD

C 2 NEMA 12 Variable Frequency Drives; 240VAC, 1 phase input power, 3 phase output to run 1/2HP, 240VAC, well pumps with output filter – Mounted on building interior wall in NEMA 12 enclosure if required

Control Panel – Motor starter Enclosure

D 1 NEMA 1/12 Painted steel, control panel for operation on 120/240 VAC service. To control two existing well pumps via motor starter, one Consolidation pump, one influent pump, and one sump pump powered from separate panelboard located on building interior wall. To include:

QTY	DESCRIPTION
1	Enclosure, NEMA 4 Painted Steel 24"h, 24”w, 8"d with padlockable handle, sub panel for system components
4	Motor Starter with Overload; 25A; pumps
2	Contactor; 25A; Vent Fan, Sump Pump

Control Panel PLC Spare parts

E 1 To include:

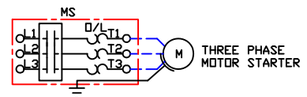
QTY	DESCRIPTION
1	Allen-Bradley 1756-ENBT Ethernet module
1	Allen-Bradley 1756-PA75 Power supply
1	Allen-Bradley 1756-IF16 Analog input card
1	Allen-Bradley 1756-OF8 Analog output card
1	Allen-Bradley 1756-IA16 Discrete input card
1	Allen-Bradley 1756-OA16 Discrete output card

Instrument List, Location, and PLC channel						Field devices										
Line no.	Transmitter Location	PLC Slot	PLC Channel	P&ID tag	Description			Range	Low/Low Setpoint	Low Setpoint	High Setpoint	High/High Setpoint	Mfg	Model No.	Vendor	Remarks
13	Treatment Building	8	0	FCV-1-2	Consolidation Facility Flow Valve Position Feedback	---		0-100%	NA	NA	NA	NA	Spears Mfg.	Spears 1 1/2" ball valve with 21201A1239-015A actuator, A-PB01-AA-CD-RF Positioning Pot, A-PK41-00-00-RB Mounting Bracket, A-P045-00-00-RH Feedback Pot, A-TR33-AM-CD-00 Feedback, A-P2 LED Indicator	H2K	Alarm setpoints do not exist
14	Treatment Building	8	1	FIT 1-1	West Containment Cell Flow Transmitter	---		0-50 GPM	1	4	22	24	Endress Hauser	Promag 50P40-EL0A1AA0BBA	H2K	All alarm setpoints are user selectable. Enter max transmitter range to disable alarm
15	Treatment Building	8	2	FIT 1-2	Consolidation Facility Sump Pump Flow Transmitter	---		0-75 GPM	5	10	50	52	Endress Hauser	Promag 50P40-EL0A1AA0BBA	H2K	All alarm setpoints are user selectable. Enter max transmitter range to disable alarm
16	Treatment Building	8	3	FIT 1-3-1	ODC Containment Cell EW-1 Flow Transmitter	---		0-50 GPM	50	50	50	50	Endress Hauser	Promag 50P40-EL0A1AA0BBA	H2K	All alarm setpoints are user selectable. Enter max transmitter range to disable alarm
17	Treatment Building	8	4	FIT 1-3-2	ODC Containment Cell EW-2 Flow Transmitter	---		0-50 GPM	50	50	50	50	Endress Hauser	Promag 50P40-EL0A1AA0BBA	H2K	All alarm setpoints are user selectable. Enter max transmitter range to disable alarm
18	Treatment Building	8	5	FIT 5-1	Treated Effluent Flow Transmitter	---	√	0-75 GPM	10	15	51	52	Endress Hauser	Promag 50P40-EL0A1AA0BBA	H2K	All alarm setpoints are user selectable. Enter max transmitter range to disable alarm
19	Treatment Building	8	6	LIT 2-1	Influent Tank Level Transmitter	---	√	0-38"	4	5	25.5	26	Siemens	Multi-Ranger 100 model 7ML5033-1AA00-2A, XPS-10 Transducer model 7ML1115-0CA40	H2K	Do not set any values over 26" for heights. All alarm setpoints are user selectable. Enter max transmitter range to disable alarm
20		8	7		spare channel	---	√	---	---	---		√	---	---	---	---
21		8	8		spare channel	---	√	---	---	---		√	---	---	---	---
22	CF Sump	8	9	LT 1-2	Consolidation Facility Sump Level Transmitter	---	√	584.39-595.39 ft	585	585.5	590	592	---	---	---	All alarm setpoints are user selectable. Enter max transmitter range to disable alarm
23	ODC	8	10	LIT 1-3-1	ODC EW-1 Level Transmitter (DownWell)	---	√	0-34.6 ft	36.6	36.6	36.6	36.6	---	---	---	All alarm setpoints are user selectable. Enter max transmitter range to disable alarm
24	ODC	8	11	LIT 1-3-2	ODC EW-1 Level Transmitter (Outside Wall)	---	√	0-34.6 ft	36.6	36.6	36.6	36.6	---	---	---	All alarm setpoints are user selectable. Enter max transmitter range to disable alarm
25	ODC	8	12	LIT 1-3-3	ODC EW-1 Level Transmitter (Inside Wall)	---	√	0-34.6 ft	36.6	36.6	36.6	36.6	---	---	---	All alarm setpoints are user selectable. Enter max transmitter range to disable alarm
26	ODC	8	13	LIT 1-3-4	ODC EW-2 Level Transmitter (DownWell)	---	√	0-34.6 ft	36.6	36.6	36.6	36.6	---	---	---	All alarm setpoints are user selectable. Enter max transmitter range to disable alarm
27	ODC	8	14	LIT 1-3-5	ODC EW-2 Level Transmitter (Outside Wall)	---	√	0-34.6 ft	36.6	36.6	36.6	36.6	---	---	---	All alarm setpoints are user selectable. Enter max transmitter range to disable alarm
28	ODC	8	15	LIT 1-3-6	ODC EW-2 Level Transmitter (Inside Wall)	---	√	0-34.6 ft	36.6	36.6	36.6	36.6	---	---	---	All alarm setpoints are user selectable. Enter max transmitter range to disable alarm
29	Treatment Building	9	0	PDIT 3-1	Cartridge Filter Differential Pressure Transmitter	---	√	0-36.14 PSI	NA	34.16	14	NA	Rosemount	3051CD3A02A1AM4D4S5 WITH 0305RC32B11B4 Manifold	H2K	Low Low and High High alarm points do not exist for this transmitter. All alarm setpoints are user selectable. Enter max transmitter range to disable alarm

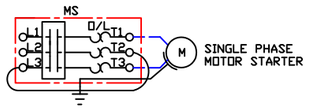
Instrument List, Location, and PLC channel						Field devices										
Line no.	Transmitter Location	PLC Slot	PLC Channel	P&ID tag	Description			Range	Low/Low Setpoint	Low Setpoint	High Setpoint	High/High Setpoint	Mfg	Model No.	Vendor	Remarks
30	Treatment Building	9	1	PDIT 4-1	GAC 1 Differential Pressure Transmitter	---	√	0-36.14 PSI	NA	34.16	12	NA	Rosemount	3051CD3A02A1AM4D4S5 WITH 0305RC32B11B4 Manifold	H2K	Low Low and High High alarm points do not exist for this transmitter. All alarm setpoints are user selectable. Enter max transmitter range to disable alarm
31	Treatment Building	9	2	PDIT 4-2	GAC 2 Differential Pressure Transmitter	---	√	0-36.14 PSI	NA	34.16	12	NA	Rosemount	3051CD3A02A1AM4D4S5 WITH 0305RC32B11B4 Manifold	H2K	Low Low and High High alarm points do not exist for this transmitter. All alarm setpoints are user selectable. Enter max transmitter range to disable alarm
32	Treatment Building	9	3	P 1-3-1	ODC EW-1 VFD Speed Feedback	---	√	0-100%	NA	NA	NA	NA	Eaton	SVXF15A1-2A1B1B1B4	H2K	Alarm setpoints do not exist
33	Treatment Building	9	4	P 1-3-2	ODC EW-2 VFD Speed Feedback	---	√	0-100%	NA	NA	NA	NA	Eaton	SVXF15A1-2A1B1B1B4	H2K	Alarm setpoints do not exist
34		9	5		spare channel	---	√	---	---	---		√	---	---	---	---
35		9	6		spare channel	---	√	---	---	---		√	---	---	---	---
36		9	7		spare channel	---	√	---	---	---		√	---	---	---	---
37		9	8		spare channel	---	√	---	---	---		√	---	---	---	---
38		9	9		spare channel	---	√	---	---	---		√	---	---	---	---
39		9	10		spare channel	---	√	---	---	---		√	---	---	---	---
40		9	11		spare channel	---	√	---	---	---		√	---	---	---	---
41		9	12		spare channel	---	√	---	---	---		√	---	---	---	---
42		9	13		spare channel	---	√	---	---	---		√	---	---	---	---
43		9	14		spare channel	---	√	---	---	---		√	---	---	---	---
44		9	15		spare channel	---	√	---	---	---		√	---	---	---	---

ARROWHEAD-OMC WAUKEGAN HARBOR, WAUKEGAN, IL/#4221
STANDARD CONTROL PANEL SYMBOLS, NOTES, AND LOAD CALCULATIONS

- ▲ TERMINAL IN PANEL
- (CK) MOTOR CONTACTOR
- (G) GREEN PILOT LIGHT
- (R) RED PILOT LIGHT
- (W) WHITE PILOT LIGHT
- (A) AMBER PILOT LIGHT
- (TDR) CONTROL TIMER
- (CR) CONTROL RELAY
- (RTM) ELAPSED RUN TIMER METER
- FLOAT SWITCH CLOSES ON RISING LEVEL
- FLOAT SWITCH OPENS ON RISING LEVEL
- PRESSURE SWITCH CLOSES ON RISING PRESSURE
- PRESSURE SWITCH OPENS ON RISING PRESSURE
- TEMPERATURE SWITCH OPENS ON RISING TEMPERATURE
- TEMPERATURE SWITCH CLOSES ON RISING TEMPERATURE
- TIMER CONTACT CLOSES AFTER TIME SET
- TIMER CONTACT OPENS AFTER TIME SET
- NORMALLY OPEN CONTACT
- NORMALLY CLOSED CONTACT
- FIELD WIRING
- MULTI-POSITION GROUNDING BLOCK



THREE PHASE MOTOR STARTER



SINGLE PHASE MOTOR STARTER

WIRING COLORING & NOTES:
1) 120VAC CONTROL - RED (16AWG OR 18AWG)
2) 120NEUTRAL - WHITE (16AWG OR 18AWG)
3) 24VDC POSITIVE - BLUE (16AWG)
4) 24VDC COMMON - WHITE W/ BLUE STRIPE (16AWG)
5) GROUND - GREEN (16AWG)
6) ALL OTHER WIRING AS INDICATED

TORQUE SPECIFICATIONS
1) FIELD WIRING TERMINALS - 7LB-IN
2) MOTOR CONTACTORS - PER MANUFACTURERS SPECIFICATIONS
3) TRANSFORMER - PER MANUFACTURERS SPECIFICATIONS
4) CIRCUIT BREAKERS - PER MANUFACTURERS SPECIFICATIONS

- NORMALLY OPEN MOMENTARY PUSHBUTTON
- NORMALLY CLOSED MOMENTARY PUSHBUTTON
- THREE POSITION H.O.A. SELECTOR SWITCH
- SELECTOR SWITCH ADDITIONAL CONTACTS MAY BE ADDED
- 1 POLE CIRCUIT BREAKER
- 2 POLE CIRCUIT BREAKER
- 3 POLE CIRCUIT BREAKER
- WIRE CONTINUATION
- DISTRIBUTION BLOCK
- FUSE WITH HOLDER (TYPE & SIZE INDICATED)
- DISCONNECT SWITCH

SYSTEM LOAD ANALYSIS

120VAC, 1Ø, 3 WIRE		L1			N
CONTROL POWER		5A			5A
SYSTEM FLA		5A			5A

REVISIONS

REV	DESCRIPTION	DATE	DWN
1	DTA ADDITION	08/24/15	RC

UNLESS SPECIFIED OTHERWISE
* DIMENSIONS ARE IN INCHES
* DO NOT SCALE DRAWING

DRAWN BY: RC
DESIGNED BY: RC
PROJECT MANAGER: MK
DATE: 04/14/14
PROJECT NO.: 4221

H2K Technologies, Inc.
7550 Commerce St, Corcoran, MN 55340, Tel: 763-746-9900

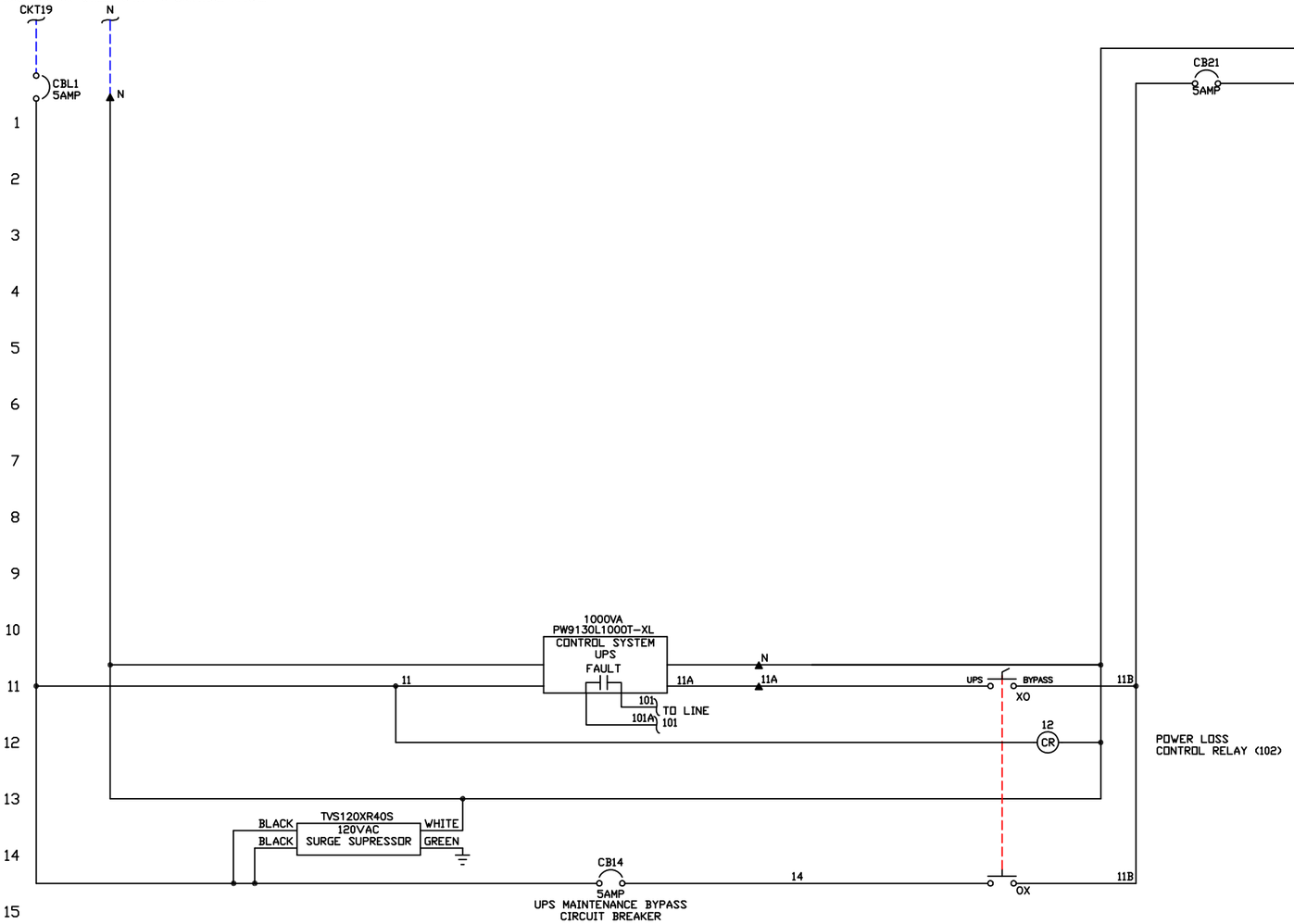
PROJECT TITLE:
ARROWHEAD-OMC WAUKEGAN HARBOR WAUKEGAN, IL

DRAWING TITLE:
SCHEMATIC CONTROL PANEL (MAIN CONTROL PANEL)

DRAWING NO.:
4221-20

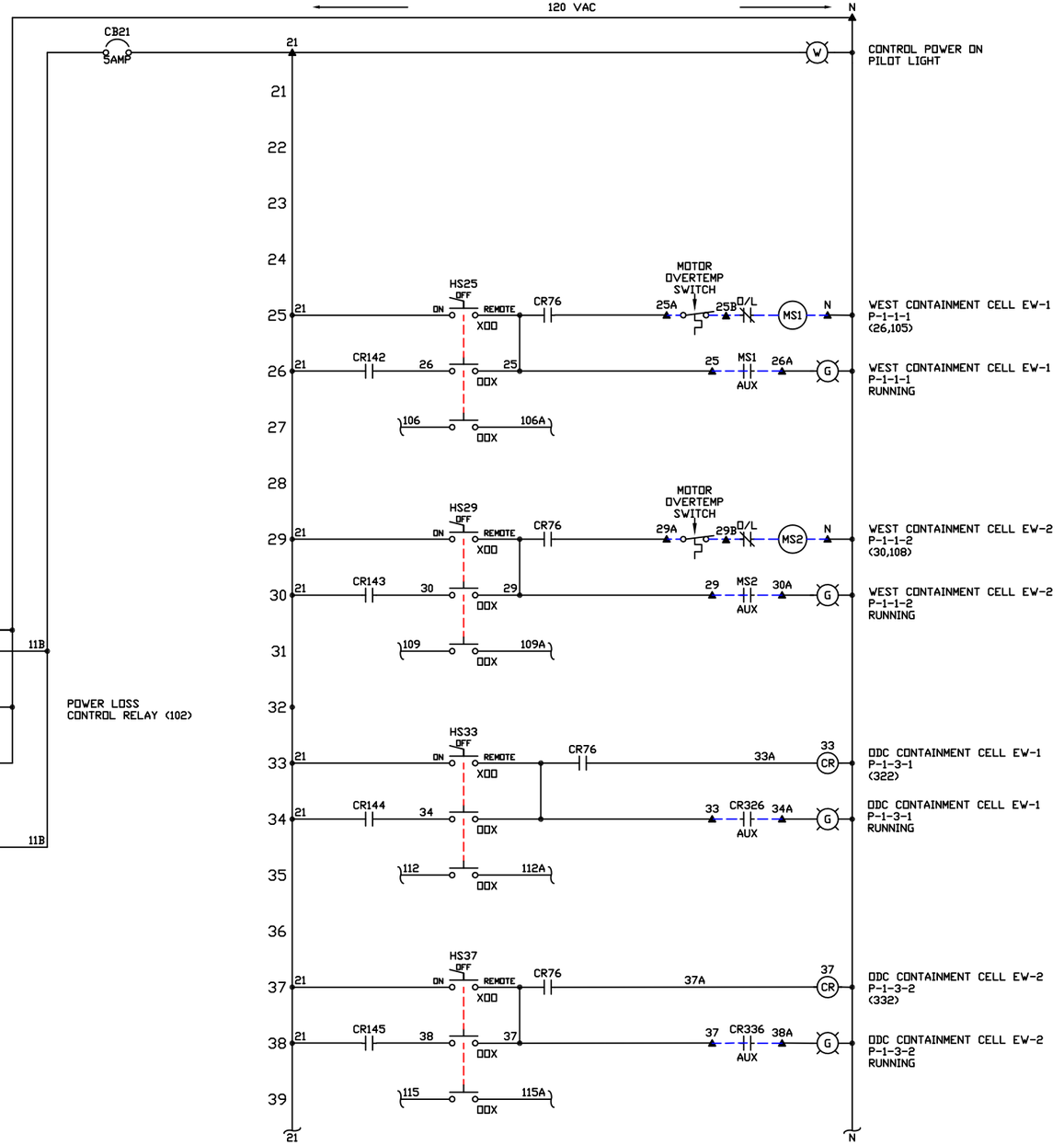
INCOMING POWER SUPPLY

120VAC, 1PHASE, 3WIRE - SYSTEM FLA 3AMPS
POWERED FROM 120/240VAC, 1P15A CIRCUIT
BREAKER LOCATED IN PANELBOARD
MOUNTED ON WALL NEXT TO CONTROL PANEL



COLUMN 1

120 VAC



REVISIONS

REV	DESCRIPTION	DATE	DWN
1	DTA ADDITION	08/24/15	RC

UNLESS SPECIFIED OTHERWISE
* DIMENSIONS ARE IN INCHES
* DO NOT SCALE DRAWING

DRAWN BY: RC
DESIGNED BY: RC
PROJECT MANAGER: MK
DATE: 04/14/14
PROJECT NO.: 4221

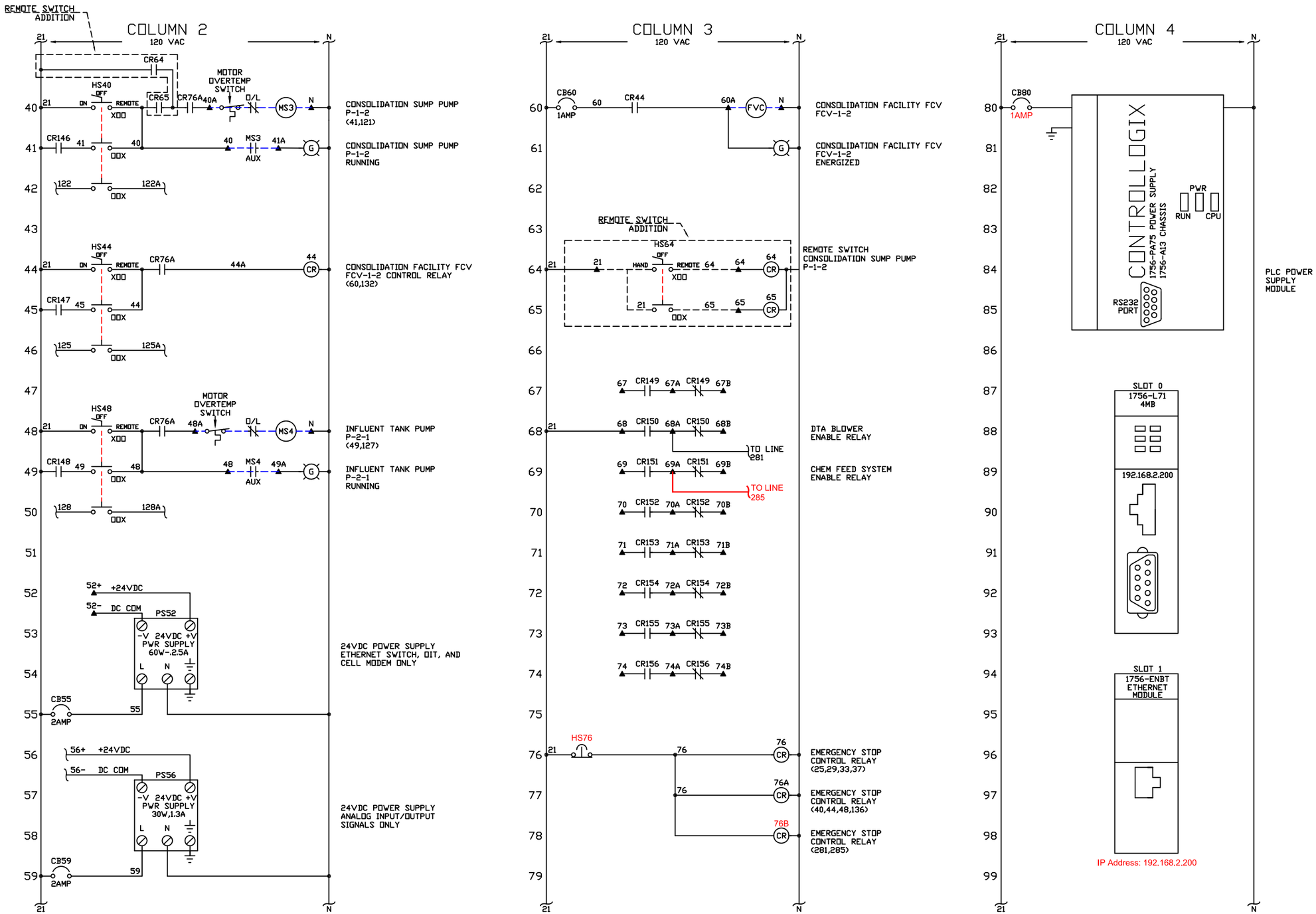
H2K Technologies, Inc.
7550 Commerce St, Corcaran, MN 55441, Tel: 763-746-9900

PROJECT TITLE:
ARROWHEAD-
OMC WAUKEGAN
HARBOR
WAUKEGAN, IL

DRAWING TITLE:
SCHEMATIC CONTROL PANEL
(MAIN CONTROL PANEL)

SHEET 2 OF 9

DRAWING NO.:
4221-21



REVISIONS			
REV	DESCRIPTION	DATE	DWN
1	DTA ADDITION	08/24/15	RC

UNLESS SPECIFIED OTHERWISE
* DIMENSIONS ARE IN INCHES
* DO NOT SCALE DRAWING

DRAWN BY: RC
DESIGNED BY: RC
PROJECT MANAGER: MK
DATE: 04/14/14
PROJECT NO.: 4221

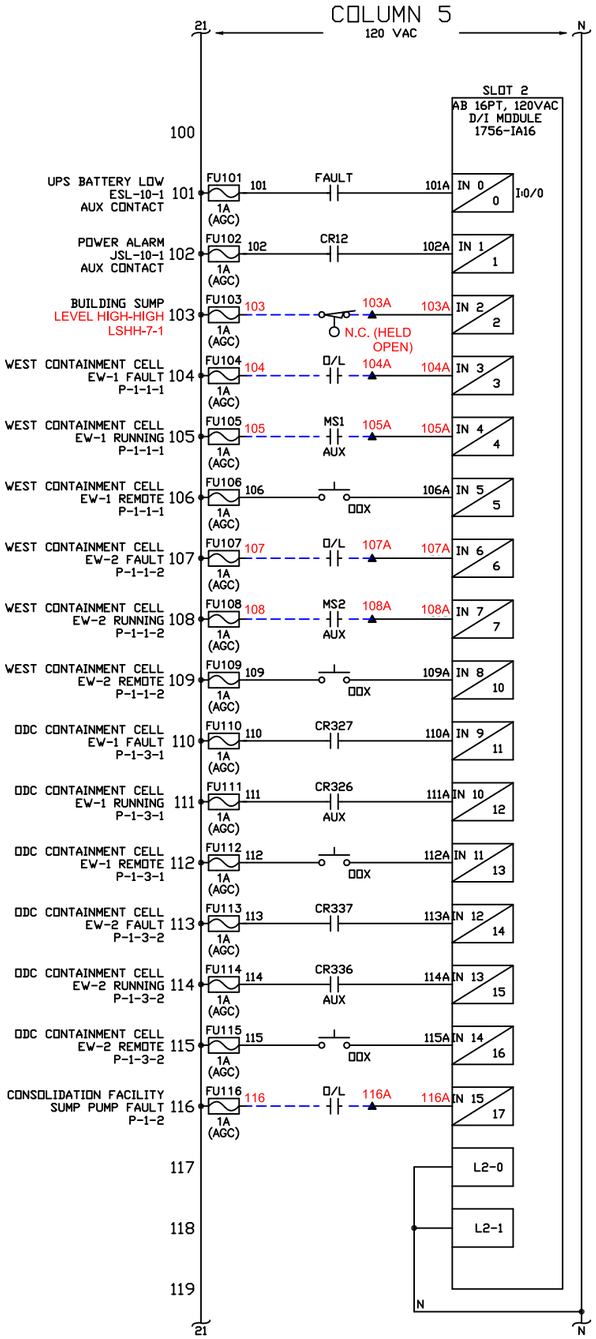
H2K Technologies, Inc.
7550 Commerce St, Corcoran, MN 55441, Tel: 763-746-9900

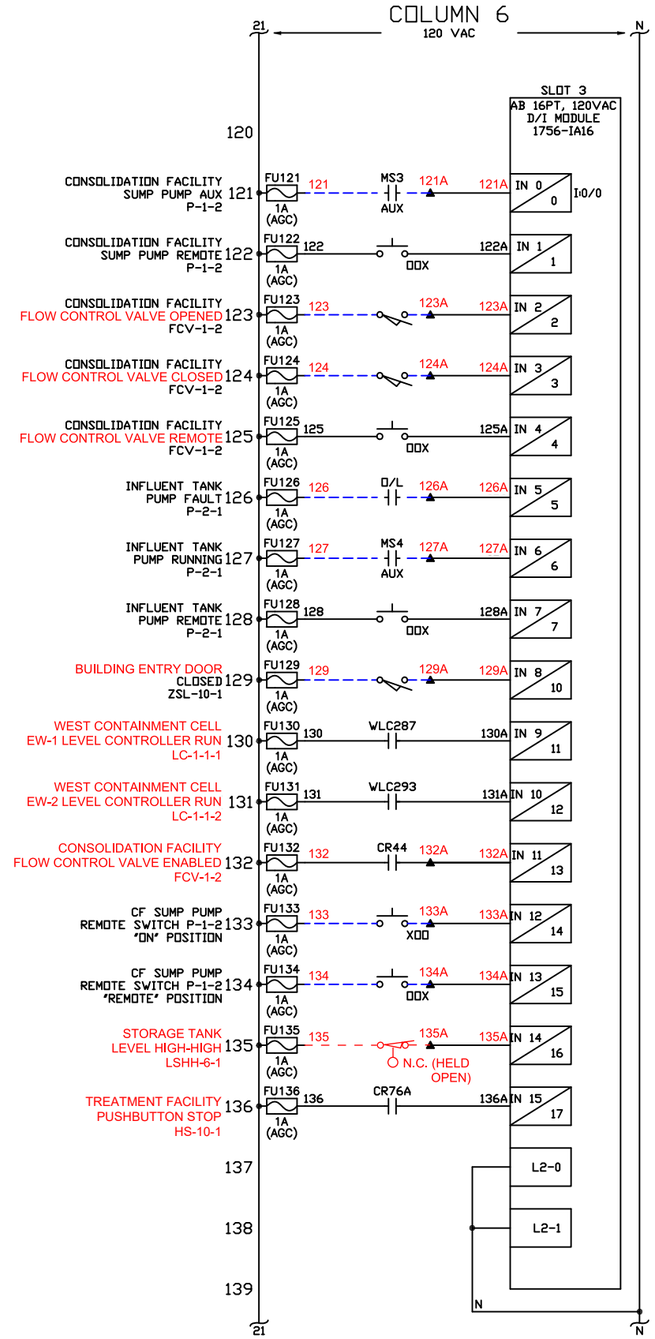
PROJECT TITLE:
ARROWHEAD–
OMC WAUKEGAN
HARBOR
WAUKEGAN, IL

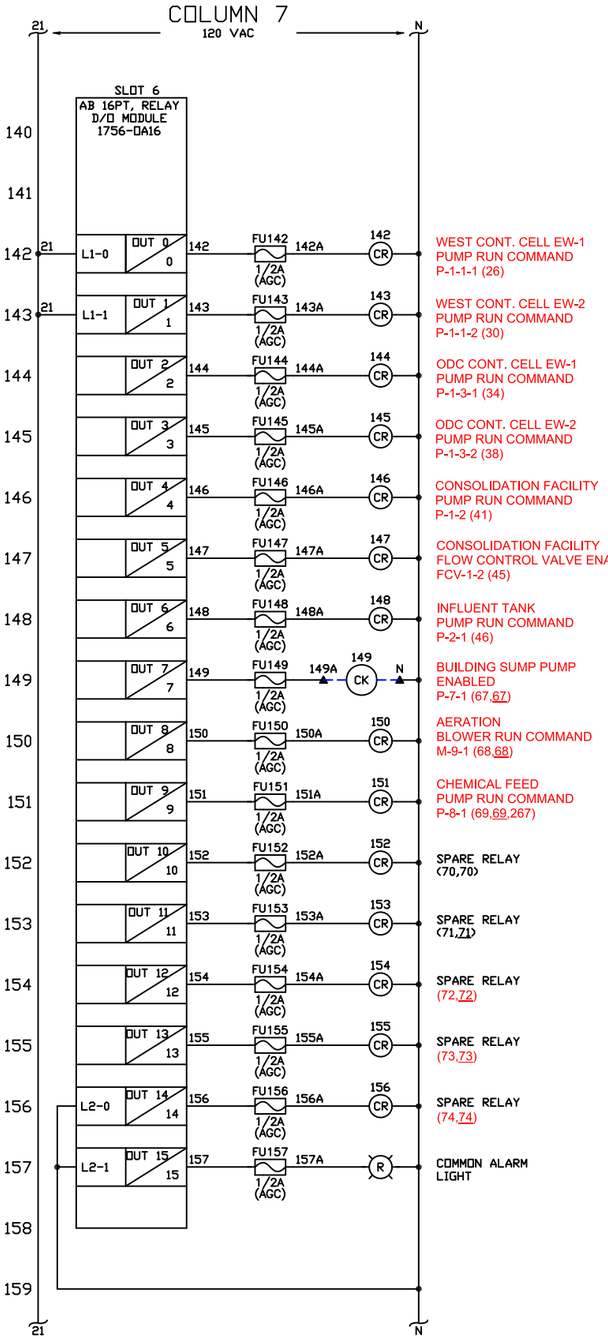
DRAWING TITLE:
SCHEMATIC CONTROL PANEL
(MAIN CONTROL PANEL)

SHEET 3 OF 9

DRAWING NO.:
4221–22







REVISIONS			
REV	DESCRIPTION	DATE	DWN
1	DTA ADDITION	08/24/15	RC

UNLESS SPECIFIED OTHERWISE
* DIMENSIONS ARE IN INCHES
* DO NOT SCALE DRAWING

DRAWN BY: RC
DESIGNED BY: RC
PROJECT MANAGER: MK
DATE: 04/14/14
PROJECT NO.: 4221

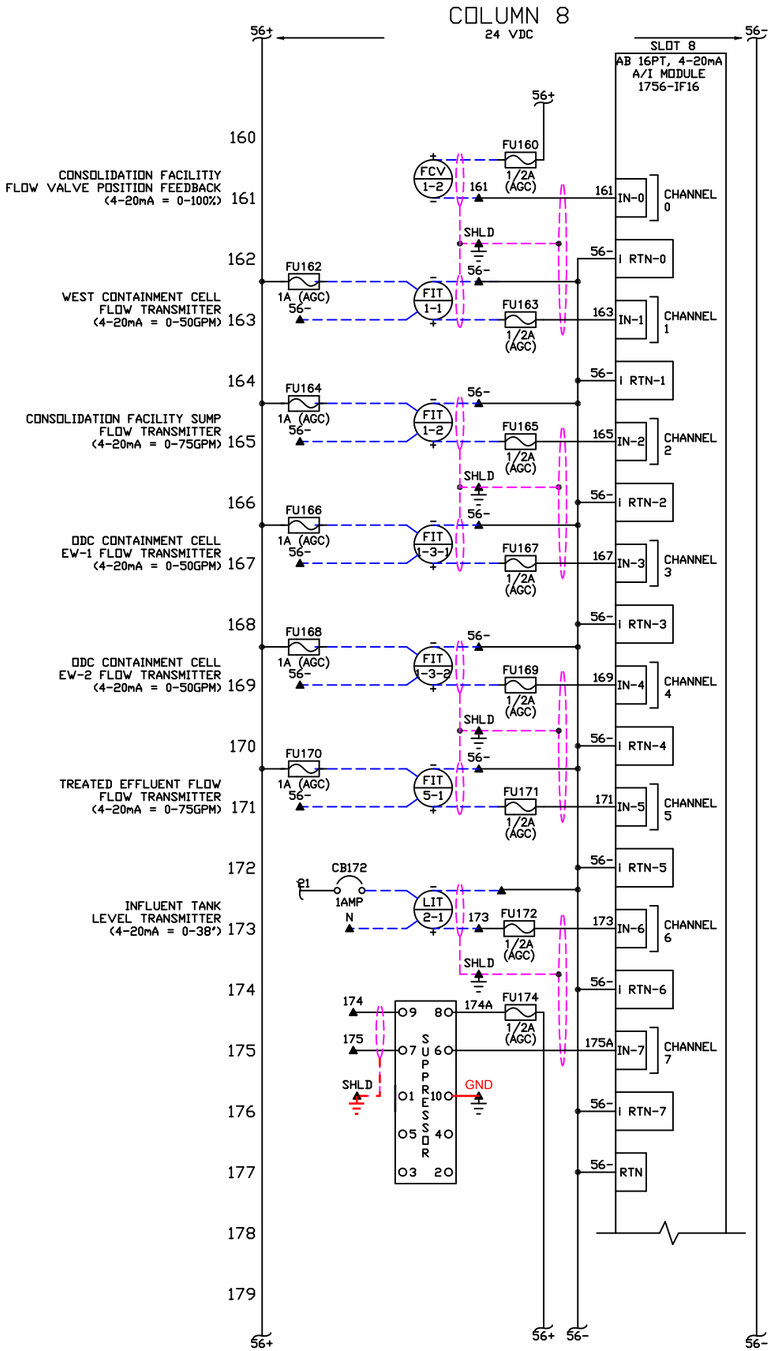
H2K Technologies, Inc.
7550 Commerce St, Corconan, MN 55441, Tel: 763-746-9900

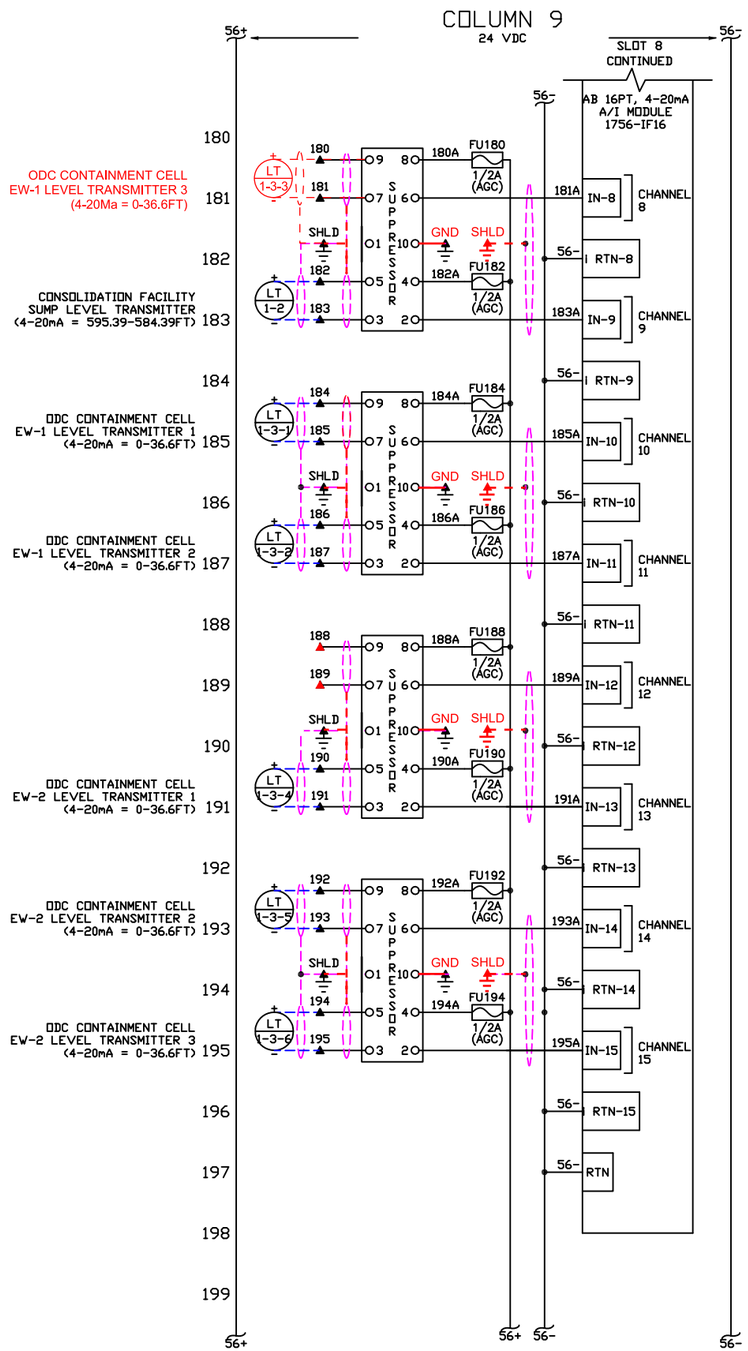
PROJECT TITLE:
ARROWHEAD–
OMC WAUKEGAN
HARBOR
WAUKEGAN, IL

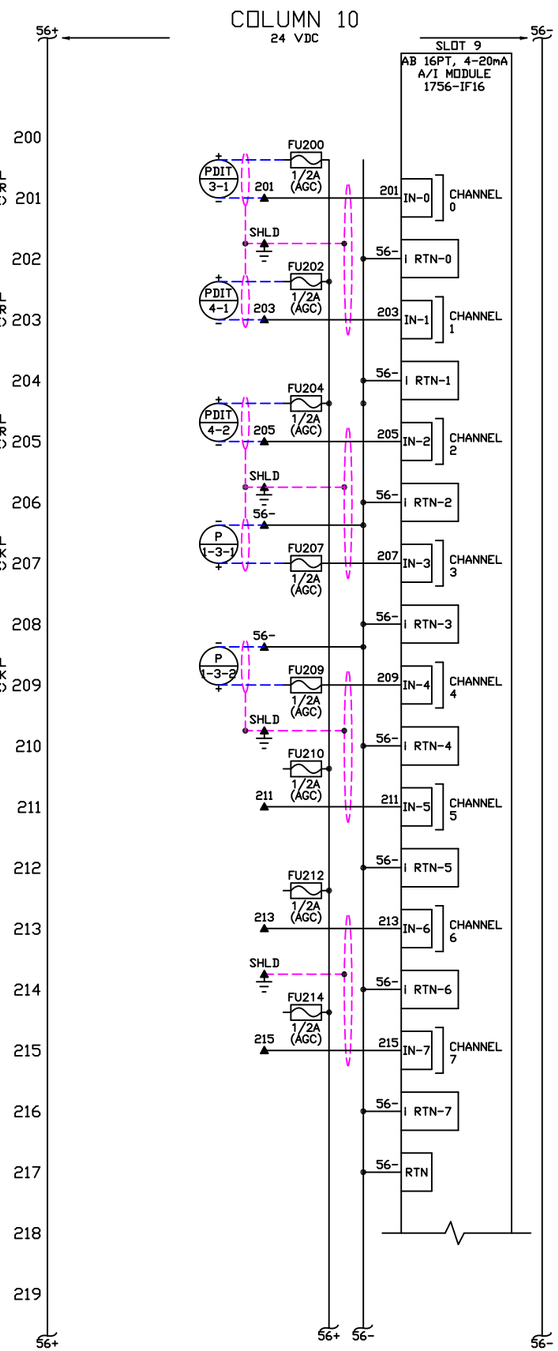
DRAWING TITLE:
SCHEMATIC CONTROL PANEL
(MAIN CONTROL PANEL)

SHEET 4 OF 9

DRAWING NO.:
4221–23







REVISIONS			
REV	DESCRIPTION	DATE	DWN
1	DTA ADDITION	08/24/15	RC

UNLESS SPECIFIED OTHERWISE
* DIMENSIONS ARE IN INCHES
* DO NOT SCALE DRAWING

DRAWN BY: RC
DESIGNED BY: RC
PROJECT MANAGER: MK
DATE: 04/14/14
PROJECT NO.: 4221

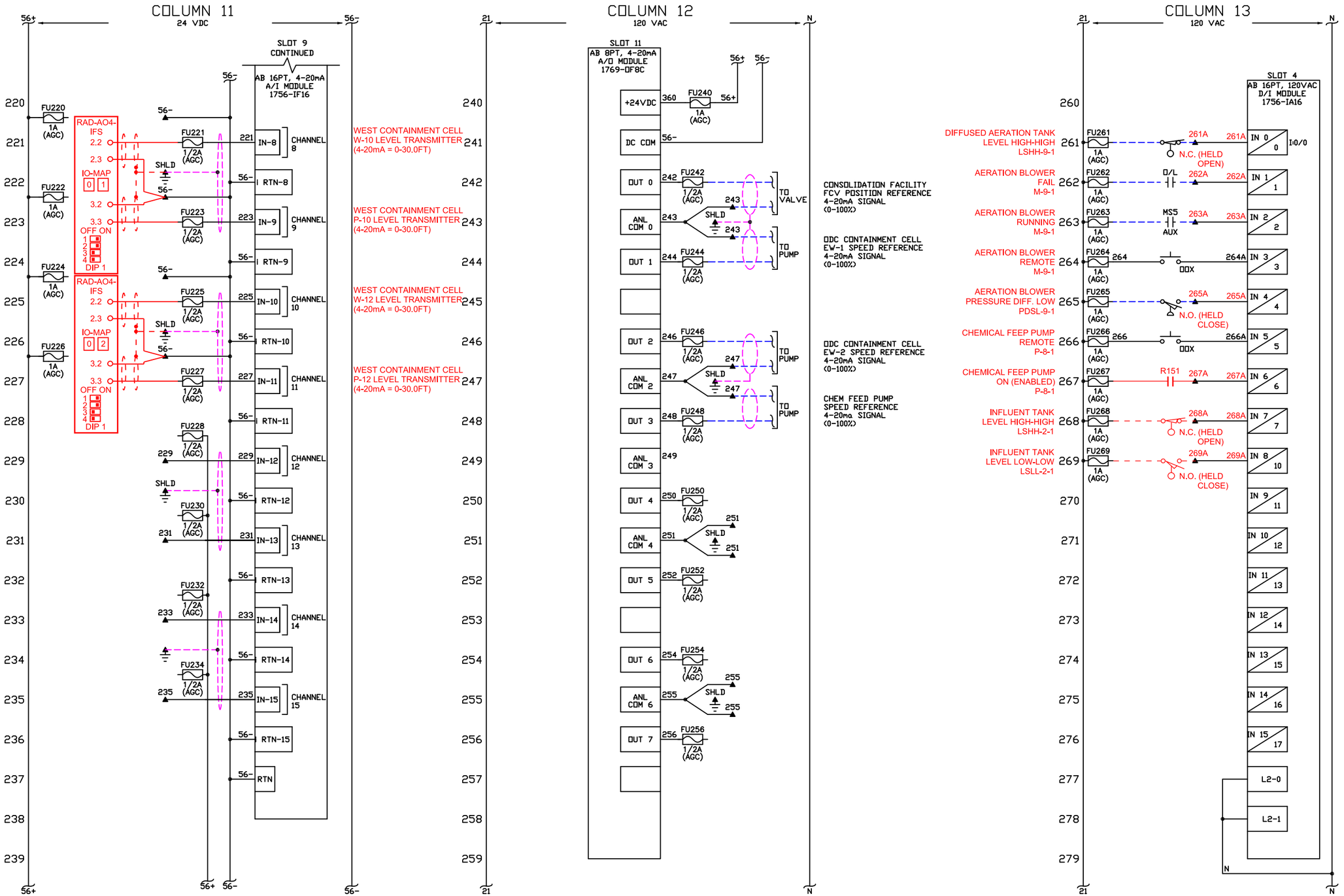
H2K Technologies, Inc.
7550 Commerce St, Corcoran, MN 55441, Tel: 763-746-9900

PROJECT TITLE:
ARROWHEAD–
OMC WAUKEGAN
HARBOR
WAUKEGAN, IL

DRAWING TITLE:
SCHEMATIC CONTROL PANEL
(MAIN CONTROL PANEL)

SHEET 5 OF 9

DRAWING NO.:
4221-24



REVISIONS			
REV	DESCRIPTION	DATE	DWN
1	DTA ADDITION	08/24/15	RC

UNLESS SPECIFIED OTHERWISE
* DIMENSIONS ARE IN INCHES
* DO NOT SCALE DRAWING

DRAWN BY: RC
DESIGNED BY: RC
PROJECT MANAGER: MK
DATE: 04/14/14
PROJECT NO.: 4221

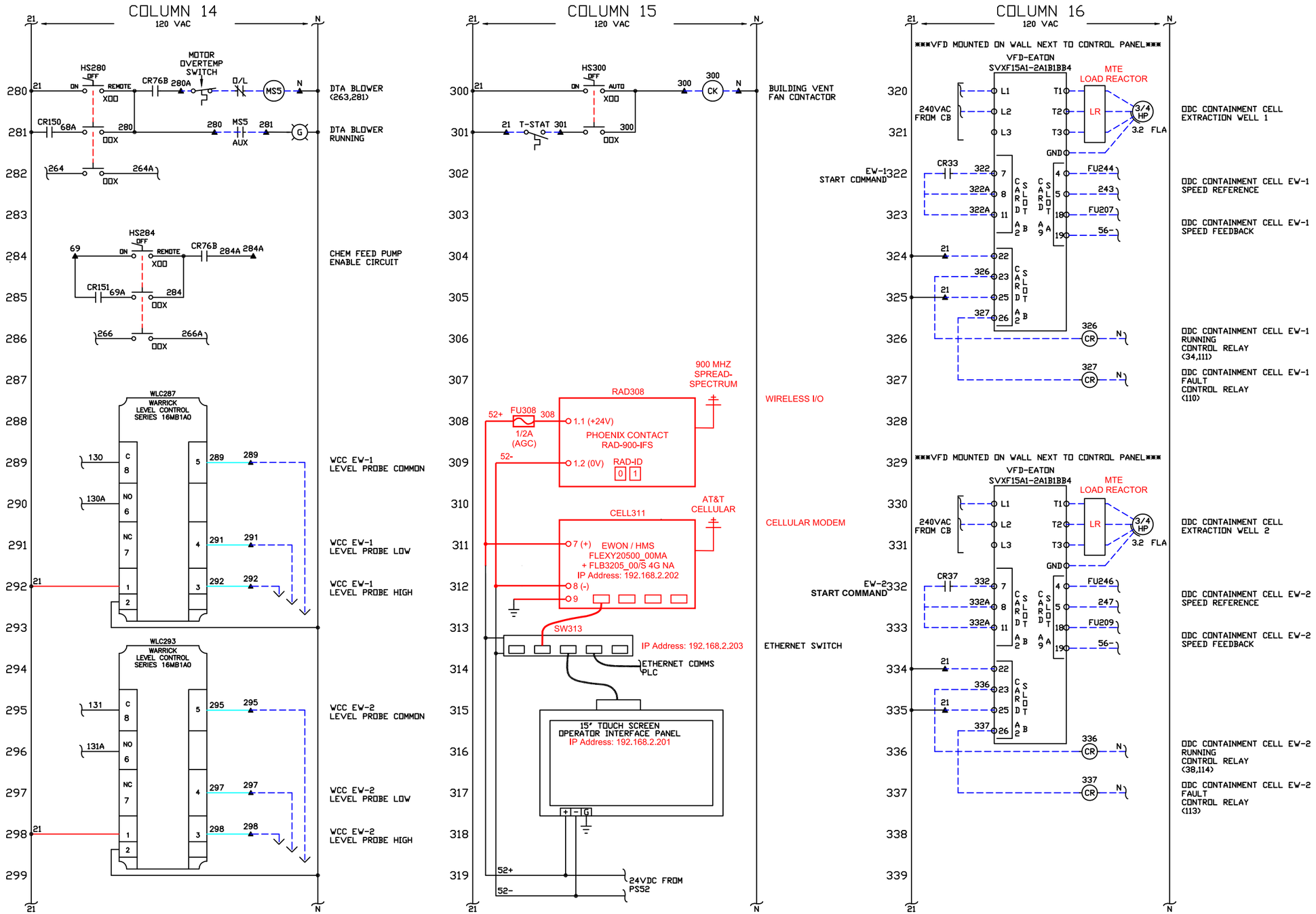
H2K Technologies, Inc.
7550 Commerce St, Corcoran, MN 55441, Tel: 763-746-9900

PROJECT TITLE:
ARROWHEAD–
OMC WAUKEGAN
HARBOR
WAUKEGAN, IL

DRAWING TITLE:
SCHEMATIC CONTROL PANEL
(MAIN CONTROL PANEL)

SHEET 6 OF 9

DRAWING NO.:
4221–25



REVISIONS			
REV	DESCRIPTION	DATE	DWN
1	DTA ADDITION	08/24/15	RC

UNLESS SPECIFIED OTHERWISE
* DIMENSIONS ARE IN INCHES
* DO NOT SCALE DRAWING

DRAWN BY: RC
DESIGNED BY: RC
PROJECT MANAGER: MK
DATE: 04/14/14
PROJECT NO.: 4221

H2K Technologies, Inc.
7550 Commerce St, Corcoran, MN 55441, Tel: 763-746-9900 ©2014

PROJECT TITLE:
ARROWHEAD-
OMC WAUKEGAN
HARBOR
WAUKEGAN, IL

DRAWING TITLE:
SCHEMATIC CONTROL PANEL
(MAIN CONTROL PANEL)

SHEET 7 OF 9

DRAWING NO.:
4221-26

FIELD WIRING
TERMINAL BLOCKS
TB1-120VAC ONLY

21
21
21
FU103 — BUILDING SUMP LEVEL LSH LSH-7-1
103
FU104 — O/L — WEST CONTAINMENT CELL EW-1 FAULT P-1-1-1
104
FU105 — MS1 AUX — WEST CONTAINMENT CELL EW-1 RUNNING P-1-1-1
105
FU106 — OOX — WEST CONTAINMENT CELL EW-1 REMOTE P-1-1-1
106
FU107 — O/L — WEST CONTAINMENT CELL EW-2 FAULT P-1-1-2
107
FU108 — MS2 AUX — WEST CONTAINMENT CELL EW-2 RUNNING P-1-1-2
108
FU109 — OOX — WEST CONTAINMENT CELL EW-2 REMOTE P-1-1-2
109
FU110 — CR — ODC CONTAINMENT CELL EW-1 FAULT P-1-3-1
110
FU111 — CR326 AUX — ODC CONTAINMENT CELL EW-1 RUNNING P-1-3-1
111
FU112 — OOX — ODC CONTAINMENT CELL EW-1 REMOTE P-1-3-1
112
FU113 — CR — ODC CONTAINMENT CELL EW-2 FAULT P-1-3-2
113
FU114 — CR336 AUX — ODC CONTAINMENT CELL EW-2 RUNNING P-1-3-2
114
FU115 — OOX — ODC CONTAINMENT CELL EW-2 REMOTE P-1-3-2
114
FU116 — O/L — CONSOLIDATION FACILITY SUMP PUMP FAULT P-1-2
116
FU121 — MS3 AUX — CONSOLIDATION FACILITY SUMP PUMP AUX P-1-2
121
FU122 — OOX — CONSOLIDATION FACILITY SUMP PUMP REMOTE P-1-2
122

FIELD WIRING
TERMINAL BLOCKS
TB1-120VAC ONLY CONTINUED

FU123 — CONSOLIDATION FACILITY FCV OPEN FCV-1-2
123
FU124 — CONSOLIDATION FACILITY FCV CLOSED FCV-1-2
124
FU125 — OOX — CONSOLIDATION FACILITY FCV REMOTE FCV-1-2
125
FU126 — O/L — INFLUENT TANK PUMP FAULT P-2-1
126
FU127 — MS4 AUX — INFLUENT TANK PUMP RUNNING P-2-1
127
FU128 — OOX — INFLUENT TANK PUMP REMOTE P-2-1
128
FU129 — ENTRY DOOR CLOSED ZSL-10-1
129
FU132
132
FU133 — XOO — CF SUMP PUMP REMOTE SWITCH P-1-2 'ON' POSITION
133
FU134 — OOX — CF SUMP PUMP REMOTE SWITCH P-1-2 'REMOTE' POSITION
134
FU135 — STORAGE TANK LSHH
135
FU136 — CR76A — EMERGENCY STOP
136
FU261 — DTA TANK LSH
261
FU262 — O/L — DTA BLOWER OVERLOAD
262
FU263 — MS5 AUX — DTA BLOWER RUNNING
263
FU265 — DTA BLOWER PSL
265
FU267
267

FIELD WIRING
TERMINAL BLOCKS
TB1-120VAC ONLY CONTINUED

FU268 — INFLUENT TANK LSHH
268
FU269 — INFLUENT TANK LSLL
269
N
N
N
N
N
N
N
21A
21
21
21
21

FIELD WIRING
TERMINAL BLOCKS
TB2-120VAC ONLY CONTINUED

21
64
65

FIELD WIRING
TERMINAL BLOCKS
TB1A-WELL PROBES ONLY

289 — WCC EW-1 LEVEL PROBE COMMON
291 — WCC EW-1 LEVEL PROBE LOW
292 — WCC EW-1 LEVEL PROBE HIGH
295 — WCC EW-2 LEVEL PROBE COMMON
297 — WCC EW-2 LEVEL PROBE LOW
298 — WCC EW-2 LEVEL PROBE HIGH

FIELD WIRING
TERMINAL BLOCKS
TB2-'DRY CONTACTS'

CR149 — 67 — CR149
67A
67B
CR150 — 68 — CR150 — 21 TO LINE 281 — DTA BLOWER ENABLE RELAY
68A
68B
CR151 — 69 — CR151 — 69 TO LINE 285 — CHEM FEED PUMP ENABLE RELAY
69A
69B
CR152 — 70 — CR152
70A
70B
CR153 — 71 — CR154
71A
71B
CR155 — 72 — CR155
72A
72B
CR156 — 73 — CR156
73A
73B
25A — MTS — MS1 — O/L — WEST CONTAINMENT CELL EW-1 MOTOR STARTER CIRCUIT
N
25 — MS1 AUX — WEST CONTAINMENT CELL EW-1 AUX CONTACT
26A
29A — MTS — MS2 — O/L — WEST CONTAINMENT CELL EW-2 MOTOR STARTER CIRCUIT
N
29 — MS2 AUX — WEST CONTAINMENT CELL EW-2 AUX CONTACT
30A

MOTOR CIRCUITS LOCATED IN MOTOR STARTER ENCLOSURE

FIELD WIRING
TERMINAL BLOCKS
TB2-'DRY CONTACTS'

40A — MTS — MS3 — O/L — CONSOLIDATION SUMP PUMP P-1-2 MOTOR STARTER CIRCUIT
N
40 — MS3 AUX — CONSOLIDATION SUMP PUMP P-1-2 AUX CONTACT
41A
48A — MTS — MS4 — O/L — INFLUENT TANK PUMP P-2-1 MOTOR STARTER CIRCUIT
N
48 — MS4 AUX — INFLUENT TANK PUMP P-2-1 AUX CONTACT
49A
300 — CK — BUILDING VENT FAN CONTACTOR
N
21 — T-STAT — BUILDING COOLING THERMOSTAT
301
149 — CK — SUMP PUMP CONTACTOR
N
503
503A
504
504A
505
505A
506
506A
507
507A
508
508A
509
509A
510
510A
511
511A

FIELD WIRING
TERMINAL BLOCKS
TB2-'DRY CONTACTS'

280A — MTS — MS5 — O/L — DTA BLOWER MOTOR STARTER CIRCUIT
N
280 — MS5 AUX — DTA BLOWER AUX CONTACT
281

REVISIONS

REV	DESCRIPTION	DATE	DWN
1	DTA ADDITION	08/24/15	RC

UNLESS SPECIFIED OTHERWISE
* DIMENSIONS ARE IN INCHES
* DO NOT SCALE DRAWING

DRAWN BY: RC
DESIGNED BY: RC
PROJECT MANAGER: MK
DATE: 04/14/14
PROJECT NO.: 4221

H2K Technologies, Inc.
7550 Commerce St, Corcoran, MN 55441, Tel: 763-746-9900

PROJECT TITLE:
ARROWHEAD-
OMC WAUKEGAN
HARBOR
WAUKEGAN, IL

DRAWING TITLE:
SCHEMATIC CONTROL PANEL
(MAIN CONTROL PANEL)

SHEET 8 OF 9

DRAWING NO.:
4221-27

FIELD WIRING TERMINAL BLOCKS TB4-ANALOG ONLY

FU161	FCV 1-2	CONSOLIDATION FACILITIY FLOW VALVE POSITION FEEDBACK (4-20mA = 0-100%)
161		
SHLD		
56-	FIT 1-1	WEST CONTAINMENT CELL FLOW TRANSMITTER (4-20mA = 0-50GPM)
FU163		
FU165	FIT 1-2	CONSOLIDATION FACILITY SUMP FLOW TRANSMITTER (4-20mA = 0-75GPM)
56-		
SHLD		
56-	FIT 1-3-1	ODC CONTAINMENT CELL EW-1 FLOW TRANSMITTER (4-20mA = 0-50GPM)
FU167		
FU169	FIT 1-3-2	ODC CONTAINMENT CELL EW-2 FLOW TRANSMITTER (4-20mA = 0-50GPM)
56-		
SHLD		
56-	FIT 5-1	TREATED EFFLUENT FLOW FLOW TRANSMITTER (4-20mA = 0-75GPM)
FU171		
FU173	LIT 2-1	INFLUENT TANK LEVEL TRANSMITTER (4-20mA = 0-38')
173		
SHLD		
174		
175		
180	LT 1-3-3	ODC CONTAINMENT CELL EW-1 LEVEL TRANSMITTER 3 (4-20Ma = 0-36.6FT) — INSIDE WALL
181		
SHLD		
183	LT 1-2	CONSOLIDATION FACILITY SUMP LEVEL TRANSMITTER (4-20mA = 584.39-595.39FT)
182		
184	LT 1-3-1	ODC CONTAINMENT CELL EW-1 LEVEL TRANSMITTER 1 (4-20mA = 0-36.6FT) — DOWNWELL
185		
SHLD		
187	LT 1-3-2	ODC CONTAINMENT CELL EW-1 LEVEL TRANSMITTER 2 (4-20mA = 0-36.6FT) — OUTSIDE WALL
186		
188		
189		
SHLD		
191	LT 1-3-4	ODC CONTAINMENT CELL EW-2 LEVEL TRANSMITTER 1 (4-20mA = 0-36.6FT) — DOWNWELL
190		

FIELD WIRING TERMINAL BLOCKS TB4-ANALOG ONLY

192	LT 1-3-5	ODC CONTAINMENT CELL EW-2 LEVEL TRANSMITTER 2 (4-20mA = 0-36.6FT) — OUTSIDE WALL
193		
SHLD		
195	LT 1-3-6	ODC CONTAINMENT CELL EW-2 LEVEL TRANSMITTER 3 (4-20mA = 0-36.6FT) — INSIDE WALL
194		
FU200	PDIT 3-1	CARTRIDGE FILTER DIFFERENTIAL PRESSURE TRANSMITTER (4-20mA = 0-36.14PSI)
201		
SHLD		
203	PDIT 4-1	GAC ABSORBTION 1 DIFFERENTIAL PRESSURE TRANSMITTER (4-20mA = 0-36.14PSI)
FU202		
FU204	PDIT 4-2	GAC ADSORPTION 2 DIFFERENTIAL PRESSURE TRANSMITTER (4-20mA = 0-36.14PSI)
205		
SHLD		
56-		ODC CONTAINMENT CELL EW-1 SPEED FEEDBACK (4-20mA = 0-100%)
FU207		
FU209		ODC CONTAINMENT CELL EW-2 SPEED FEEDBACK (4-20mA = 0-100%)
56-		
SHLD		
211		
FU210		
FU212		
213		
SHLD		
215		
FU214		
FU221		
56-		
SHLD		
56-		
FU223		
FU225		
56-		
SHLD		
56-		
FU227		

FIELD WIRING TERMINAL BLOCKS TB4-ANALOG ONLY

FU228
229
SHLD
231
FU230
FU232
233
SHLD
235
FU234

FIELD WIRING TERMINAL BLOCKS TB4-ANALOG ONLY

FU345		
56-		
SHLD		
56-		
FU347		
FU349		
56-		
SHLD		
56-		
FU351		
FU353		
56-		
SHLD		
56-		
FU355		
FU242		TO VALVE — CONSOLIDATION FACILITY FCV POSITION REFERENCE 4-20mA SIGNAL (0-100%)
243		
SHLD		
243		TO PUMP — ODC CONTAINMENT CELL EW-1 SPEED REFERENCE 4-20mA SIGNAL (0-100%)
FU244		
FU246		TO PUMP — ODC CONTAINMENT CELL EW-2 SPEED REFERENCE 4-20mA SIGNAL (0-100%)
247		
SHLD		
247		TO PUMP — CHEMICAL FEED SYSTEM SPEED REFERENCE 4-20mA SIGNAL (0-100%)
FU248		
FU250		
251		
SHLD		
251		
FU252		
FU254		
255		
SHLD		
255		
FU256		

FIELD WIRING TERMINAL BLOCKS INSTRUMENT 120VAC POWER

FU162	WEST CONTAINMENT CELL FLOW TRANSMITTER (4-20mA = 0-50GPM)
56-	
56-	CONSOLIDATION FACILITY SUMP FLOW TRANSMITTER (4-20mA = 0-50GPM)
FU164	
FU166	ODC CONTAINMENT CELL EW-1 FLOW TRANSMITTER (4-20mA = 0-50GPM)
56-	
56-	ODC CONTAINMENT CELL EW-2 FLOW TRANSMITTER (4-20mA = 0-50GPM)
FU168	
FU170	TREATED EFFLUENT FLOW FLOW TRANSMITTER (4-20mA = 0-50GPM)
56-	
56-	
FU220	
FU222	
56-	
56-	
FU224	
FU226	
56-	

REVISIONS

REV	DESCRIPTION	DATE	DWN
1	DTA ADDITION	08/24/15	RC

UNLESS SPECIFIED OTHERWISE
* DIMENSIONS ARE IN INCHES
* DO NOT SCALE DRAWING

DRAWN BY: RC
DESIGNED BY: RC
PROJECT MANAGER: MK
DATE: 04/14/14
PROJECT NO.: 4221

H2K Technologies, Inc.
7550 Commerce St, Corcoran, MN 55441, Tel: 763-746-9900

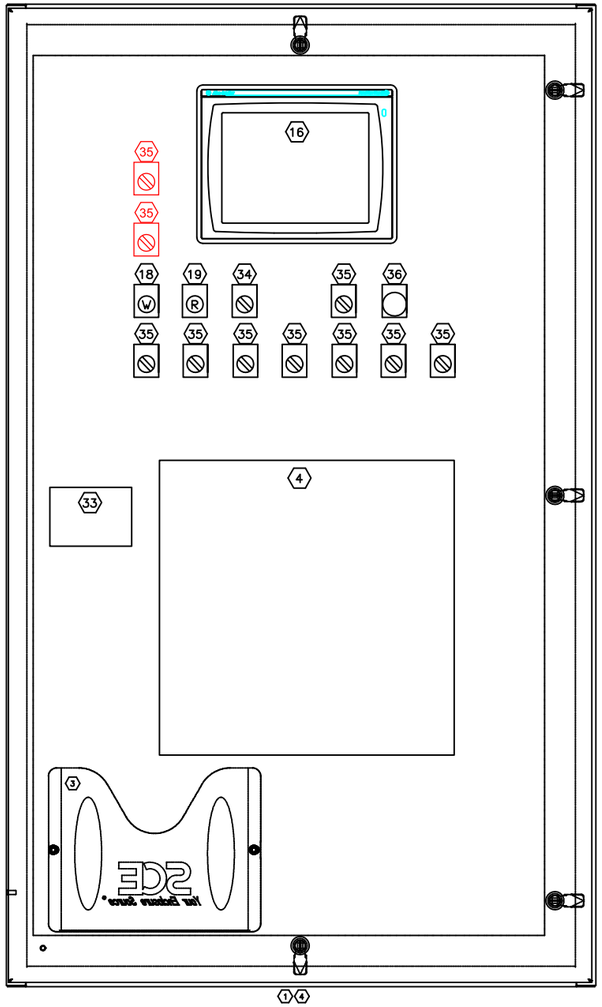
PROJECT TITLE:
ARROWHEAD–
OMC WAUKEGAN
HARBOR
WAUKEGAN, IL

DRAWING TITLE:
SCHEMATIC CONTROL PANEL
(MAIN CONTROL PANEL)

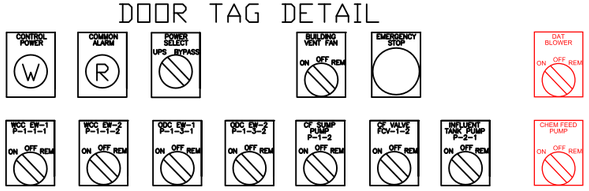
SHEET 9 OF 9

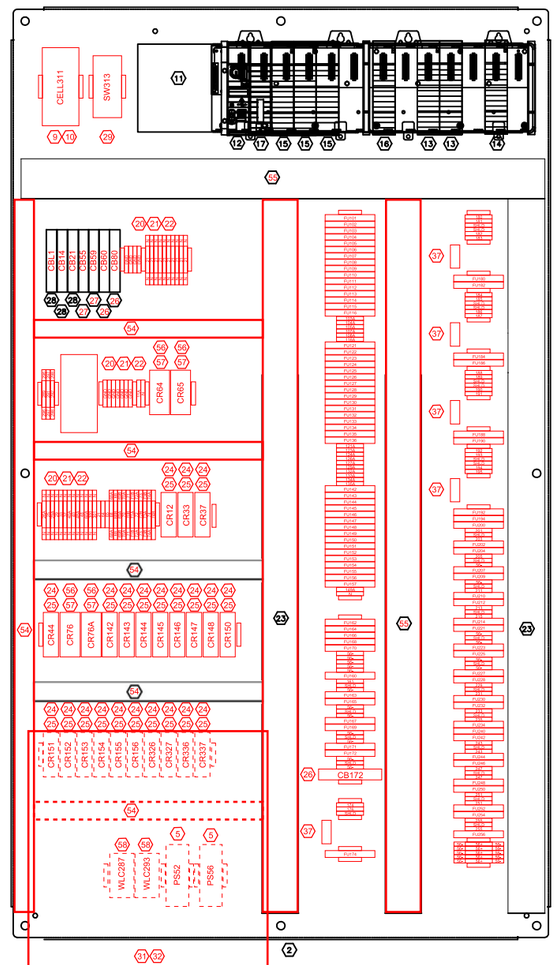
DRAWING NO.:
4221–28

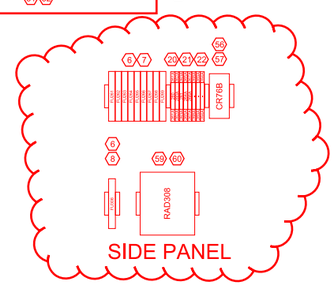
NEMA 12 ANSI-61 GRAY PAINTED CARBON STEEL 60' H X 36'W X 16"D CONTROL PANEL ENCLOSURE - CP1



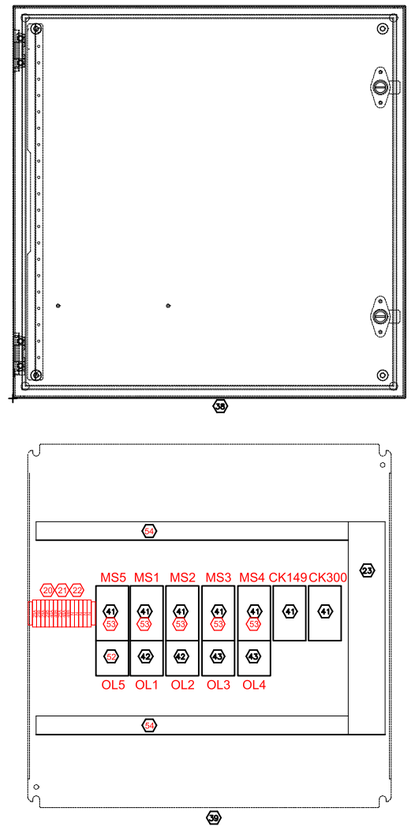
DOOR TAG DETAIL







NEMA 12 ANSI-61 GRAY PAINTED CARBON STEEL 24' H X 24'W X 8"D CONTROL PANEL ENCLOSURE - CP2



ITEM	QUANTITY	DESCRIPTION	MANUFACTURER	CATALOG NUMBER
1	1	ENC, 48X36X08, NEMA4 PAINTED STEEL	SAGINAW	SCE-48EL3616LP
2	1	SUBPANEL, 48X36	SAGINAW	SCE-48P36
3	1	PRINT POCKET	SAGINAW	SCE-PP101201
4	1	FOLDING SHELF	SAGINAW	SCE-FS1818
5	2	POWER SUPPLY, 24 VDC, 60 W	IDEC	PS5R-SD24
6	A/R	HOLDER, FUSE	PHOENIX	UK6 3-HESI
7	A/R	FUSE, 1A	BUSSMAN	AGC1
8	A/R	FUSE, 1/2 A	BUSSMAN	AGC1/2
9	1	CELLULAR BASE UNIT	EWON	FLEXY20500_00MA
10	1	CELLULAR MODEM MODULE	EWON	FLB3205_00/S 4G
11	1	POWER SUPPLY/CHASSIS	ALLEN-BRADLEY	1756-PA75/1756-A13
12	1	PROCESSOR, PLC, CONTROLLOGIX	ALLEN-BRADLEY	1756-L71
13	2	MODULE, ANALOG INPUT	ALLEN-BRADLEY	1756-IF16
14	1	MODULE, ANALOG OUTPUT	ALLEN-BRADLEY	1756-OF8C
15	3	MODULE, DISCRETE INPUT	ALLEN-BRADLEY	1756-IA16
16	1	MODULE, DISCRETE OUTPUT	ALLEN-BRADLEY	1756-OA16
17	1	ETHERNET COMM MODULE	ALLEN-BRADLEY	1756-ENBT
18	1	PILOT LIGHT, WHITE	IDEC	APD1126N-R-120
19	1	PILOT LIGHT, RED	IDEC	APD1126N-W-120
20	A/R	FIELD WIRING TERMINAL BLOCKS	ASI	UK 5NASIUKKB5
21	A/R	TERMINAL BLOCK END PIECE	ASI	ASIDUK410
22	A/R	TERMINAL END STOP	ASI	ASIUD1B
23	A/R	WIRE DUCT 2X3	PANDUIT	F2X2WH6
24	22	RELAY, 2PDT, 3A, 120 VAC COIL	IDEC	RY2S-UL AC120V
25	22	RELAY, BASE, 2PDT	IDEC	SY2S-05
26	3	CIRCUIT BREAKER-1AMP, 1POLE	EATON	WMZT1C01
27	2	CIRCUIT BREAKER-2AMP, 1POLE	EATON	WMZT1C02
28	3	CIRCUIT BREAKER-5AMP, 1POLE	EATON	WMZT1C05
29	1	ETHERNET SWITCH	PHOENIX	FL SWITCH LM 8TX
30	1	VFD OUTPUT FILTER (NOT SHOWN)	MTE	RLW-03P401+CAB-8
31	1	1000VA UPS	EATON	PW9130L1000T-XL
32	1	UPS, BATTERY MODULE	EATON	PW3190N1000T-EBM
33	1	PANEL INTERFACE	MENCOM	GF-RJ45-USB-10-R-32
34	1	SWITCH, TWO POSITION, UPS/BYPASS	IDEC	ASD2L20N
35	10	SWITCH, THREE POSITION, ON/OFF/REMOTE	IDEC	ASLD39920DN-G-120V
36	1	EMERGENCY STOP	IDEC	AVD311NR
37	5	ANALOG SIGNAL SUPPRESSOR	EDCO	PC-642
38	1	ENC, 24X24X08, NEMA 4 PAINTED STEEL	SAGINAW	SCE-24EL2408LP
39	1	SUBPANEL, 24X24	SAGINAW	SCE-24P24
40	1	PRINT POCKET	SAGINAW	SCE-PP101201
41	7	CONTACTOR	SQUARE D	LC1D25G7
42	2	OVERLOAD	SQUARE D	LRD10
43	2	OVERLOAD	SQUARE D	LRD16
44	2	VFD (NOT SHOWN-MOUNTED ON BLDG WALL)	EATON	SVXF-15A1-2A1B1B1B4
45	1	LOAD CENTER (NOT SHOWN)	SQUARE D	QO142M200
46	2	CIRCUIT BREAKER 2POLE 30AMP	SQUARE D	QOB230
47	4	CIRCUIT BREAKER 2POLE 20AMP	SQUARE D	QOB220
48	4	CIRCUIT BREAKER 2POLE 15AMP	SQUARE D	QOB215
49	2	CIRCUIT BREAKER 1POLE 20AMP	SQUARE D	QOB120
50	1	CIRCUIT BREAKER 2POLE 20A GFCI	SQUARE D	QOB220GFI
51	6	CIRCUIT BREAKER 1POLE 15AMP	SQUARE D	QOB115
52	1	OVERLOAD	SQUARE D	LRD14
53	5	AUX. CONTACT BLOCK	SQUARE D	LADN203
54	A/R	WIRE DUCT	PANDUIT	F1X2WH6
55	A/R	WIRE DUCT	PANDUIT	F3X2WH6
56	5	RELAY, 4PDT, 6A, 120 VAC COIL	IDEC	RU4S-A110
57	5	RELAY, BASE, 4PDT	IDEC	SY4S-05
58	2	LEVEL CONTROLLER, 120 VAC	GEM/WARRICK	16MB1B0
59	3	RADIO 900 MHZ	PHOENIX	RAD-900-IFS
60	2	RADIO ANALOG OUTPUT MODULE	PHOENIX	RAD-AO4-IFS
61	2	RADIO ANALOG INPUT MODULE	PHOENIX	RAD-AI4-IFS
62	2	LIGHTNING ARRESTOR	KPSI	50-02-2790
63	1	CIRCUIT BREAKER 2 POLE 60A	SQUARE D	QOB260
64	1	LOAD CENTER DOOR(NOT SHOWN)	SQUARE D	QOC42UF

REVISIONS

REV	DESCRIPTION	DATE	DWN
1	DTA ADDITION	08/24/15	RC

UNLESS SPECIFIED OTHERWISE
* DIMENSIONS ARE IN INCHES
* DO NOT SCALE DRAWING

DRAWN BY: RC
DESIGNED BY: RC
PROJECT MANAGER: MK
DATE: 04/14/14
PROJECT NO.: 4221

H2K Technologies, Inc.
7550 Commerce St, Corcoran, MN 55441, Tel: 763-746-9900

PROJECT TITLE:
ARROWHEAD-
OMC WAUKEGAN
HARBOR
WAUKEGAN, IL

DRAWING TITLE:
CONTROL PANEL LAYOUT

SHEET 1 OF 1

DRAWING NO.:
4221-29

ARROWHEAD-OMC WAUKEGAN HARBOR, WAUKEGAN, IL/#4221
STANDARD CONTROL PANEL SYMBOLS, NOTES, AND LOAD CALCULATIONS

▲ TERMINAL IN PANEL

(CK) MOTOR CONTACTOR

(G) GREEN PILOT LIGHT

(R) RED PILOT LIGHT

(W) WHITE PILOT LIGHT

(A) AMBER PILOT LIGHT

(TDR) CONTROL TIMER

(CR) CONTROL RELAY

(RTM) ELAPSED RUN TIMER METER

FLOAT SWITCH CLOSES ON RISING LEVEL

FLOAT SWITCH OPENS ON RISING LEVEL

PRESSURE SWITCH CLOSES ON RISING PRESSURE

PRESSURE SWITCH OPENS ON RISING PRESSURE

TEMPERATURE SWITCH OPENS ON RISING TEMPERATURE

TEMPERATURE SWITCH CLOSES ON RISING TEMPERATURE

TIMER CONTACT CLOSES AFTER TIME SET

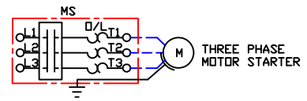
TIMER CONTACT OPENS AFTER TIME SET

NORMALLY OPEN CONTACT

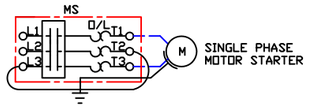
NORMALLY CLOSED CONTACT

FIELD WIRING

MULTI-POSITION GROUNDING BLOCK



THREE PHASE MOTOR STARTER



SINGLE PHASE MOTOR STARTER

NORMALLY OPEN MOMENTARY PUSHBUTTON

NORMALLY CLOSED MOMENTARY PUSHBUTTON

THREE POSITION H.O.A. SELECTOR SWITCH

SELECTOR SWITCH ADDITIONAL CONTACTS MAY BE ADDED

1 POLE CIRCUIT BREAKER

2 POLE CIRCUIT BREAKER

3 POLE CIRCUIT BREAKER

WIRE CONTINUATION

DISTRIBUTION BLOCK

FUSE WITH HOLDER (TYPE & SIZE INDICATED)

DISCONNECT SWITCH

WIRING COLORING & NOTES:
1) 120VAC CONTROL - RED (16AWG OR 18AWG)
2) 120NEUTRAL - WHITE (16AWG OR 18AWG)
3) 24VDC POSITIVE - BLUE (16AWG)
4) 24VDC COMMON - WHITE W/ BLUE STRIPE (16AWG)
5) GROUND - GREEN (16AWG)
6) ALL OTHER WIRING AS INDICATED

TORQUE SPECIFICATIONS
1) FIELD WIRING TERMINALS - 7LB-IN
2) MOTOR CONTACTORS - PER MANUFACTURERS SPECIFICATIONS
3) TRANSFORMER - PER MANUFACTURERS SPECIFICATIONS
4) CIRCUIT BREAKERS - PER MANUFACTURERS SPECIFICATIONS

POWER PANEL SCHEDULE

CIRCUIT DESCRIPTION	BKR A / P	CKT NO.	CKT NO.	BKR A / P	CIRCUIT DESCRIPTION
WEST CONTAINMENT CELL EW-1 P-1-1-1	15 / 2	1	2	15 / 2	WEST CONTAINMENT CELL EW-2 P-1-1-2
		3	4		
CONSOLIDATION FACILITY SUMP PUMP P-1-2	30 / 2	5	6	30 / 2	INFLUENT TANK PUMP P-2-1
		7	8		
ODC CONTAINMENT CELL EW-1 P-1-3-1	15 / 2	9	10	15 / 2	ODC CONTAINMENT CELL EW-2 P-1-3-2
		11	12		
BUILDING GFCI RECEPTICLES	20 / 1	13	14	15 / 1	BUILDING LIGHTING
BUILDING VENT FAN	15 / 1	15	16	15 / 1	CONTROL PANEL WTS-W CP-1 & CP2
BUILDING HEATER 1	20 / 2	17	18	20 / 2	BUILDING HEATER 2
		19	20		
HEAT TRACE CIRCUIT 1 & 2 (GFCI)	20 / 2	21	22	15 / 1	BUILDING SUMP PUMP P-7-1
		23	24	15 / 1	SPARE
CHEMICAL FEED PUMP P-8-1	15 / 1	25	26	20 / 2	STORAGE TANK PUMP P-1-6
SPARE	20 / 1	27	28		
DAT BLOWER M-9-1	20 / 2	29	30	/	UNUSED
		31	32	/	UNUSED
UNUSED	/	33	34	/	UNUSED
UNUSED	/	35	36	/	UNUSED
UNUSED	/	37	38	/	UNUSED
BUILDING TVSS	60 / 2	39	40	/	UNUSED
		41	42	/	UNUSED

REVISIONS

REV	DESCRIPTION	DATE	DWN
A	RELEASE FOR SUBMITTAL	04/18/14	RC
B	RELEASE FOR RE-SUBMITTAL	05/01/14	RC
C	RELEASE FOR PRODUCTION	05/29/14	RC
D	AS BUILT	07/10/14	RC
E	DTA BLOWER ADDER	08/25/15	RC

UNLESS SPECIFIED OTHERWISE
* DIMENSIONS ARE IN INCHES
* DO NOT SCALE DRAWING

DRAWN BY: RC
DESIGNED BY: RC
PROJECT MANAGER: MK
DATE: 04/14/14
PROJECT NO.: 4221

H2K Technologies, Inc.
7550 Commerce St, Corcoran, MN 55340, Tel: 763-746-9900©2012

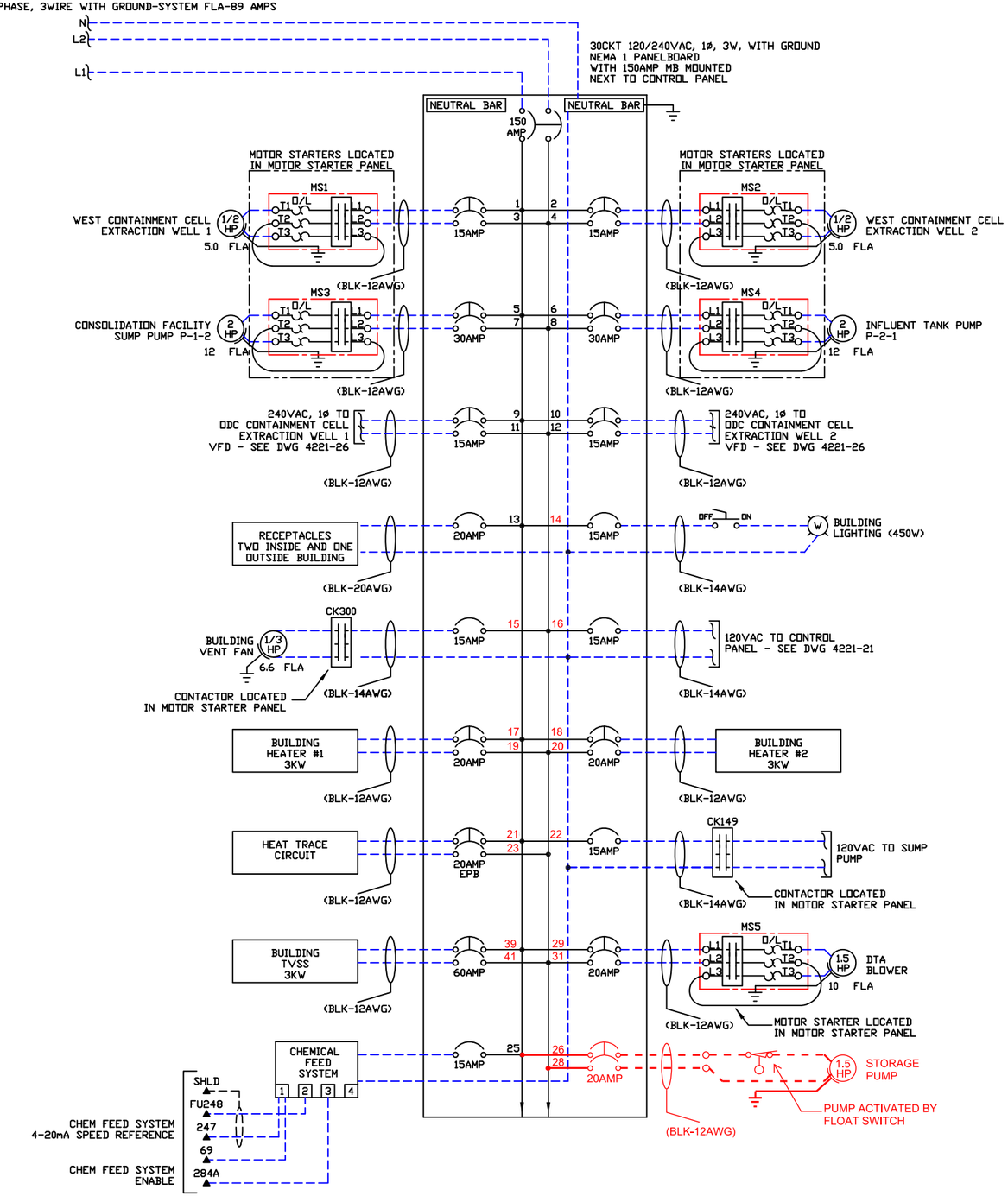
PROJECT TITLE:
ARROWHEAD-
OMC WAUKEGAN
HARBOR
WAUKEGAN, IL

DRAWING TITLE:
SCHEMATIC CONTROL PANEL
(POWER DISTRIBUTION PANEL)

DRAWING NO.:
4221-30

INCOMING POWER SUPPLY

120/240VAC, 1PHASE, 3WIRE WITH GROUND-SYSTEM FLA-89 AMPS



REVISIONS

REV	DESCRIPTION	DATE	DWN
A	RELEASE FOR SUBMITTAL	04/18/14	RC
B	RELEASE FOR RE-SUBMITTAL	05/01/14	RC
C	RELEASE FOR PRODUCTION	05/29/14	RC
D	AS BUILT	07/10/14	RC
E	DAT BLOWER ADDER	08/25/15	RC

UNLESS SPECIFIED OTHERWISE
* DIMENSIONS ARE IN INCHES
* DO NOT SCALE DRAWING

DRAWN BY: RC
DESIGNED BY: RC
PROJECT MANAGER: MK
DATE: 04/14/14
PROJECT NO.: 4221

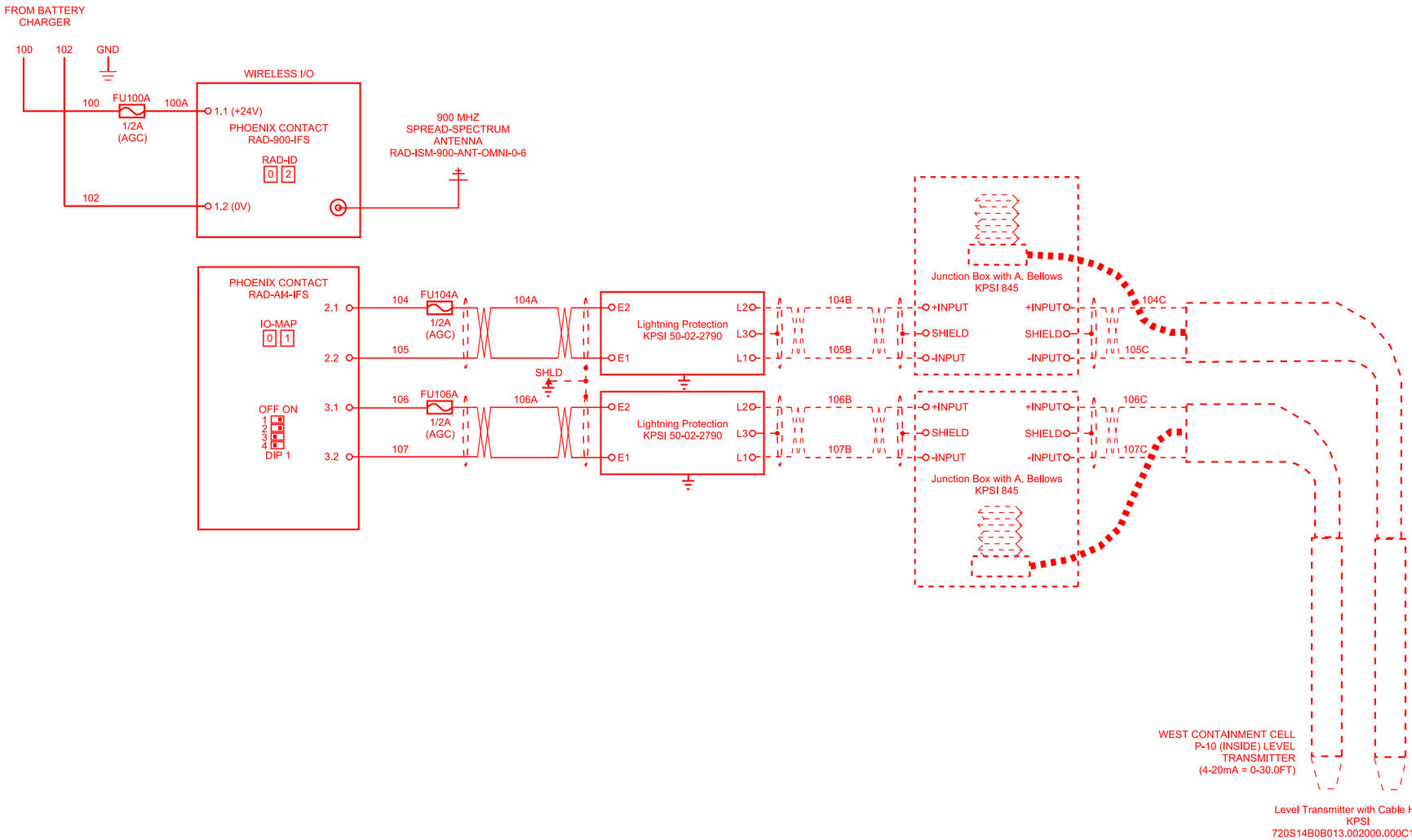
H2K Technologies, Inc.
7550 Commerce St, Corcoran, MN 55340, Tel: 763-746-9900

PROJECT TITLE:
ARROWHEAD-
OMC WAUKEGAN
HARBOR
WAUKEGAN, IL

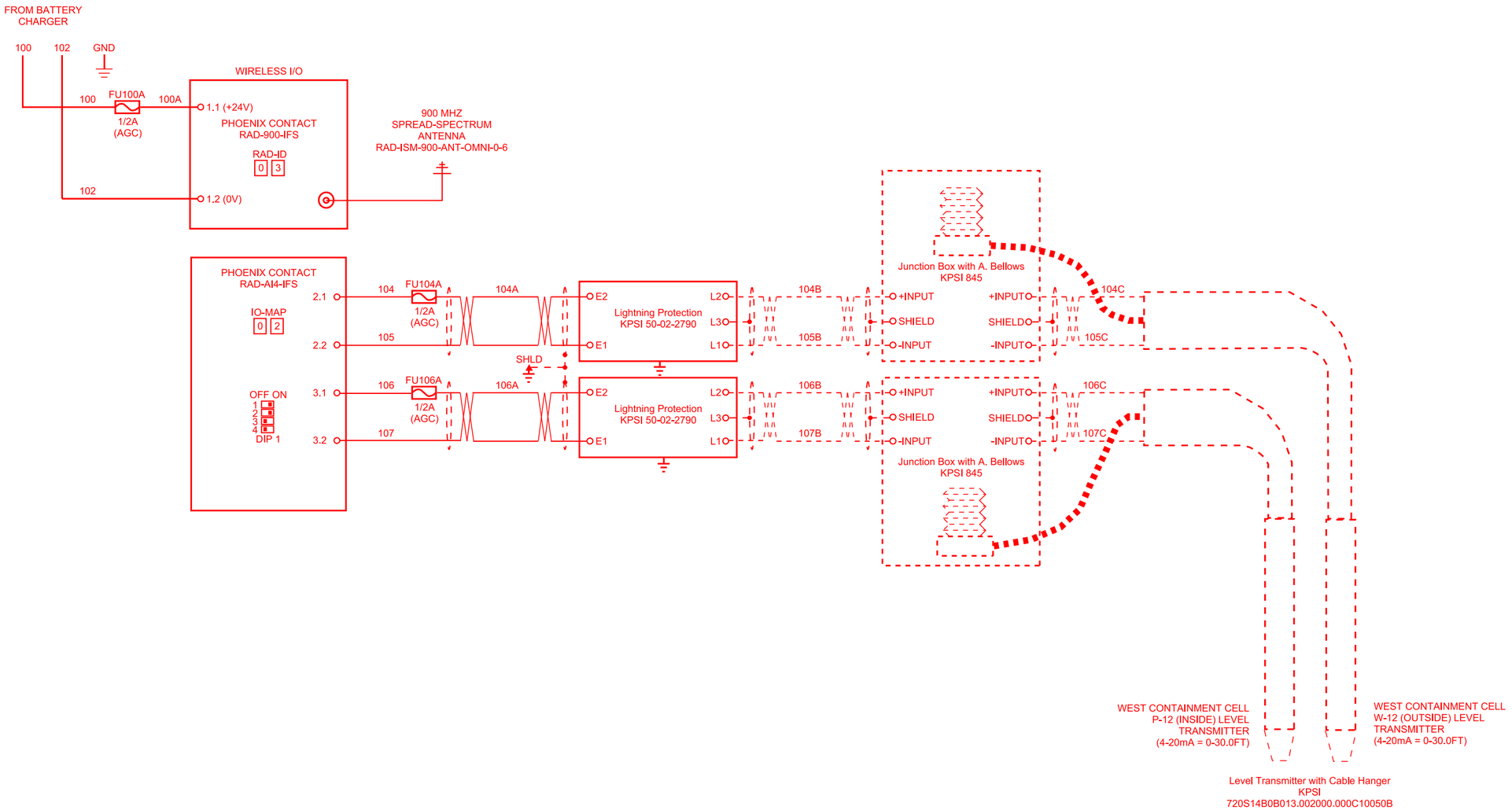
DRAWING TITLE:
SCHEMATIC CONTROL PANEL
(POWER DISTRIBUTION PANEL)

SHEET 2 OF 2

DRAWING NO.:
4221-31



			PROJECT TITLE:	DRAWING TITLE: SCHEMATIC CONTROL PANEL (REMOTE WIRELESS I/O PANEL 1)	SHEET OF DRAWING NO.:



			PROJECT TITLE:	DRAWING TITLE: SCHEMATIC CONTROL PANEL (REMOTE WIRELESS I/O PANEL 2)	SHEET OF DRAWING NO.:

1. CONTROLS OPERATION DESCRIPTION

Scope

The controls were provided by H2K Technologies, Inc. for the CH2M Hill-Waukegan, IL/#4221 site. This section on controls is provided as a descriptive summary of the P & ID. This section can be used to determine the conditions which must be met for each item to operate.

General Operational Conditions

- Any switch in the "ON" position will operate the corresponding circuit under any alarm condition, except for a motor temperature fault or a circuit overload. The "ON" position is for diagnostics or to clear alarms. The system should never be left unattended while any switch is in the "ON" position.
- Any switch in the "REMOTE" position and the associated HMI "AUTO/MANUAL" pushbutton in the "MANUAL" position will operate the corresponding circuit under any alarm condition once the HMI "START" pushbutton is depressed, except for a motor temperature fault or a circuit overload. This position is for diagnostics or to clear alarms. The system should never be left unattended while any switch is in this mode of operation.
- When the ODC wells and CF Control Valve are in the "REMOTE" and the HMI "MANUAL" position, the ODC wells will run via a manual speed setpoint entered on the HMI (0-100%) and the valve will move to the position entered on the HMI (0-100%)
- To reset an alarm, switch all switches to the "OFF" position. Clear the cause of the alarm condition. Then the press the "RESET" button on the Operator Interface. If the panel will not reset, then an alarm condition still exists.
- Building Sump Pump will run via its own integral floats.
- Pressing any "EMERGENCY STOP" will shut down all motors immediately including the Building Sump Pump. This occurs both in the "ON" and "REMOTE" position.
- All alarms indicated on the operator interface that DO NOT shut down equipment will initiate a remote notification via the webport.
- All Dwell Timers allow the associated pump to continue to run past its off setpoint for the time period entered on the HMI. The Delay Timers entered on the HMI will not allow the associated pump to re-start until its time period has expired. These timers are designed to minimize the number of starts for the pump
- The CF Sump Pump P-1-2 also has a three position switch located at the pump on the berm at the CF pond. To operate the CF Sump Pump from the control panel, this switch must be in the "REMOTE" position. If in the "OFF" position, the pump is disabled and will not run via the main control panel. Placing the switch in the "ON" position will bypass all control functions from the main control panel except for a motor overtemperature fault, circuit overload, or if the "EMERGENCY STOP" is depressed.
- To operate the Diffused Aeration Tank (DTA), open the valve from the influent header to the DTA and close the valve to the influent tank. Turn the DTA switch on the control panel to the "REMOTE" position. To run the system without the DTA, adjust the valves to from the header to bypass the DTA and move water directly to the influent tank. Turn off the breaker for the DTA in the breaker panel. Turn the switch for the DTA to the "REMOTE" position on control panel. NOTE THAT THE SYSTEM WILL NOT RUN UNLESS THE DTA SWITCH IS IN THE "REMOTE" POSITION.
- To operate the metering pump, make sure that the influent end of the tubing is in the drum and turn the metering pump switch on the control panel to the "REMOTE" position.

Default Passwords (passwords are case sensitive – enter value without quotation marks)

1) Intrusion Alarm Setup (enables button to goto Intrusion Alarm Setup Screen) – "abcd"
2) Intrusion Alarm Disable Code (this disables the Intrusion Alarm) – default is "zxc"
3) Non Critical Parameters – "Info"
4) WCC EW-1 run time reset – "P-1-1-1"
5) WCC EW-2 run time reset – "P-1-1-2"
6) ODC EW-1 run time reset – "P-1-3-1"
7) ODC EW-2 run time reset – "P-1-3-2"
8) Influent Valve FCV 1-2 run time reset – "FCV-1-2"
10) CF Sump Pump run time reset – "P-1-2"
11) Influent Tank Pump run time reset – "P-2-1"

Normal Startup

1) Place Influent Pump P-2-1 into the "REMOTE" position via the three position switch on panel door.
   a. On the "TREATMENT BUILDING SCREEN",
      1) Ensure the HMI "AUTO/MANUAL" pushbutton is in the "AUTO" mode.
      2) Observe the "PUMP START" and "PUMP OFF" setpoint. Adjust if required.
2) Place WCC EW-1 into the "REMOTE" position via the three position switch on panel door.
   a. On the "WCC EXTRACTION WELL SCREEN",
      1) Ensure the HMI "AUTO/MANUAL" pushbutton is in the "AUTO" mode.
3) Place WCC EW-2 into the "REMOTE" position via the three position switch on panel door.
   a. On the "WCC EXTRACTION WELL SCREEN",
      1) Ensure the HMI "AUTO/MANUAL" pushbutton is in the "AUTO" mode.
4) Place ODC EW-1 into the "REMOTE" position via the three position switch on panel door.
   a. On the "ODC EXTRACTION WELL SCREEN",
      1) Ensure the HMI "AUTO/MANUAL" pushbutton is in the "AUTO" mode.
      2) Select "CONTROL MODE" operation. If "LEVEL" is selected, enter the desired level setpoint on the "ENTER LEVEL SP" button.
      3) Select "CONTROL MODE" operation. If "DIFFERENTIAL" is selected, enter the desired level setpoint on the "ENTER DIF SP" button.
5) Place ODC EW-2 into the "REMOTE" position via the three position switch on panel door.
   a. On the "ODC EXTRACTION WELL SCREEN",
      1) Ensure the HMI "AUTO/MANUAL" pushbutton is in the "AUTO" mode.
      2) Select "CONTROL MODE" operation. If "LEVEL" is selected, enter the desired level setpoint on the "ENTER LEVEL SP" button.
      3) Select "CONTROL MODE" operation. If "DIFFERENTIAL" is selected, enter the desired level setpoint on the "ENTER DIF SP" button.
6) Place INFLUENT VALVE FCV 2-1into the "REMOTE" position via the three position switch on panel door.
   a. On the "CONSOLIDATION FACILITY SUMP SCREEN",
      1) Ensure the HMI "AUTO/MANUAL" pushbutton is in the "AUTO" mode.
      2) On the "TREATMENT BUILDING SCREEN", Enter the desired treatment sytem maximum flow. The valve will attempt to maintain a flow rate determined by subtracting the WCC Wells and ODC Wells flows from the maximum flow rate entered on the "TREATMENT BUILDING SCREEN"
7) Place Consolidated Facility Sump Pump P-1-2 into the "REMOTE" position via the three position switch on panel door.
   a. On the "TREATMENT BUILDING SCREEN",
      1) Ensure the HMI "AUTO/MANUAL" pushbutton is in the "AUTO" mode.
      2) Observe the "PUMP START" and "PUMP OFF" setpoint. Adjust if required.

Normal Shutdown

1) Place Influent Pump P-2-1 into the "OFF" position.
2) Place WCC EW-1 into the "OFF" position.

3) Place WCC EW-2 into the “OFF” position.
4) Place ODC EW-1 into the “OFF” position.
5) Place ODC EW-2 into the “OFF” position.
6) Place INFLUENT VALVE FCV 2-1into the “OFF” position.
7) Place Consolidated Facility Sump Pump P-1-2 into the “OFF” position.

2. OPERATION DESCRIPTION

In the “REMOTE” position and the HMI “AUTO/MANUAL” pushbutton in the “AUTO” position

Item	Required conditions
WCC EW-1 P-1-1-1	Well Pump Down Latch via Warrick Level Controller must exist. Effluent Flow Meter FIT 5-1 failure must NOT exist. Influent Tank LIT 2-1 failure must NOT exist. Power Alarm JSL-10-1 must NOT exist. Building Sump Alarm LSH-7-1 must NOT exist. FIT 1-1 FALL must NOT exist. Influent Tank LIT 2-1 LAHH must NOT exist. Both Dwell and Delay Timers must allow pump to run. The corresponding circuit breaker or overload must NOT be tripped.
WCC EW-2 P-1-1-2	Well Pump Down Latch via Warrick Level Controller must exist. Effluent Flow Meter FIT 5-1 failure must NOT exist. Influent Tank LIT 2-1 failure must NOT exist. Power Alarm JSL-10-1 must NOT exist. Building Sump Alarm LSH-7-1 must NOT exist. FIT 1-1 FALL must NOT exist. Influent Tank LIT 2-1 LAHH must NOT exist. Both Dwell and Delay Timers must allow pump to run. The corresponding circuit breaker or overload must NOT be tripped.
ODC EW-1 P-1-3-1 (Once running, ODC EW-1 will run via a PID loop in a Level or Differential mode based on selection on OIT)	Well Pump Down Latch via Pump Speed from PID loop must exist. Effluent Flow Meter FIT 5-1 failure must NOT exist. Influent Tank LIT 2-1 failure must NOT exist. Power Alarm JSL-10-1 must NOT exist. Building Sump Alarm LSH-7-1 must NOT exist. FIT 1-3-1 FALL must NOT exist. Influent Tank LIT 2-1 LAHH must NOT exist. ODC EW-1 LIT 1-3-1 LAL must NOT exist. ODC EW-1 LIT 1-3-1 LALL must NOT exist. Both Dwell and Delay Timers must allow pump to run. The corresponding circuit breaker or overload must NOT be tripped.
ODC Ew-2 P-1-3-2 (Once running, ODC EW-1 will run via a PID loop in a Level or Differential mode based on selection on OIT)	Well Pump Down Latch via Pump Speed from PID loop must exist. Effluent Flow Meter FIT 5-1 failure must NOT exist. Influent Tank LIT 2-1 failure must NOT exist. Power Alarm JSL-10-1 must NOT exist. Building Sump Alarm LSH-7-1 must NOT exist. FIT 1-3-2 FALL must NOT exist. Influent Tank LIT 2-1 LAHH must NOT exist. ODC EW-1 LIT 1-3-4 LAL must NOT exist. ODC EW-1 LIT 1-3-4 LALL must NOT exist. Both Dwell and Delay Timers must allow pump to run. The corresponding circuit breaker or overload must NOT be tripped.
CF Sump Pump P-1-2	Overall System Minimum Flow rate must be maintained. Well Pump Down Latch via LIT 2-1 must exist. Effluent Flow Meter FIT 5-1 failure must NOT exist. Influent Tank LIT 2-1 failure must NOT exist. Power Alarm JSL-10-1 must NOT exist.

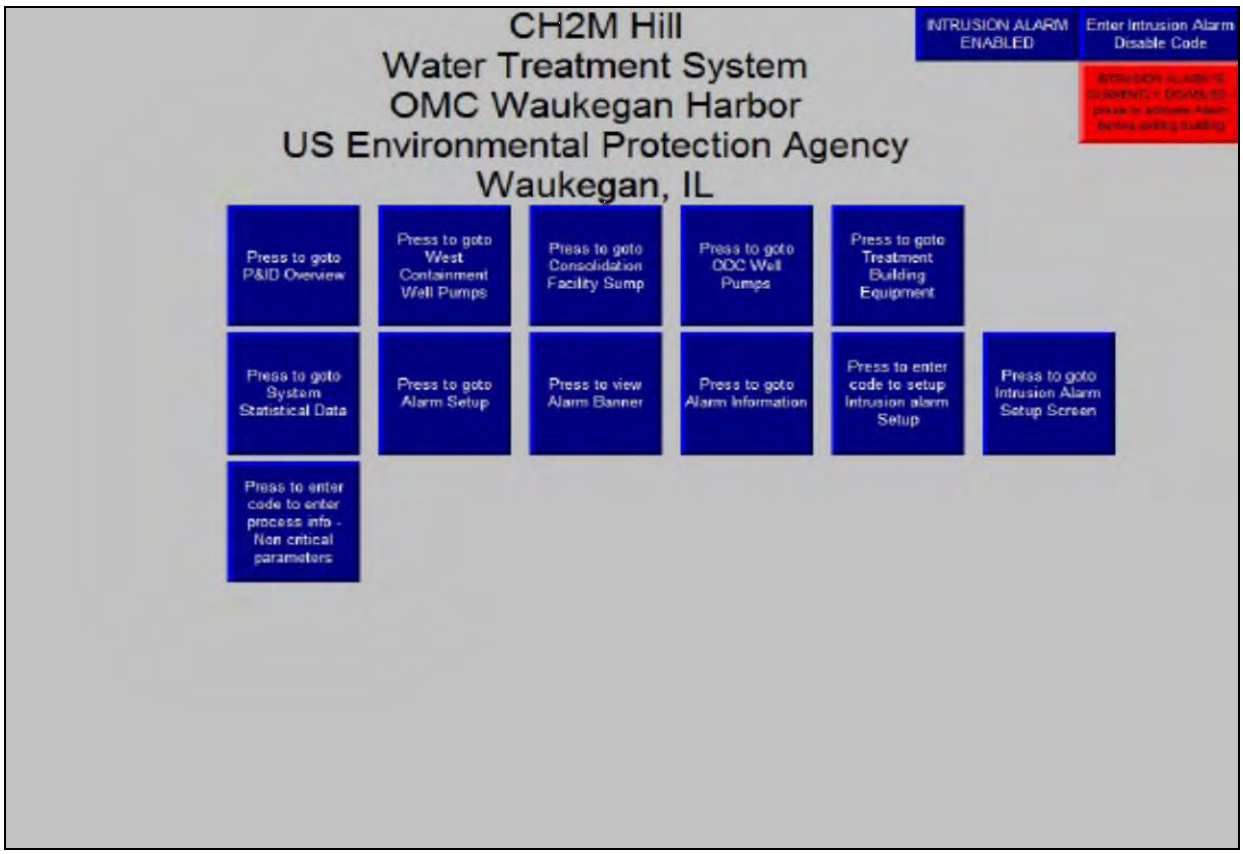
Item	Required conditions
	Building Sump Alarm LSH-7-1 must NOT exist. FIT 1-2 FALL must NOT exist. Influent Tank LIT 2-1 LAHH must NOT exist. Both Dwell and Delay Timers must allow pump to run. The corresponding circuit breaker or overload must NOT be tripped.
CF Control Valve FCV-1-2	CF Sump Pump P-1-2 must be running Valve postion controlled via PID loop The corresponding circuit breaker or overload must NOT be tripped.
Influent Tank Pump P-2-1	Well Pump Down Latch via LIT 2-1 must exist. Effluent Flow Meter FIT 5-1 failure must NOT exist. Influent Tank LIT 2-1 failure must NOT exist. Power Alarm JSL-10-1 must NOT exist. Building Sump Alarm LSH-7-1 must NOT exist. Influent Tank Pump Run Failure must NOT exist. Influent Tank Pump Fault must NOT exist. FIT 5-1 FALL must NOT exist. Influent Tank LIT 2-1 LALL must NOT exist. Cartridge Filter PDIT 3-1 DPAH must NOT exist. GAC 1 PDIT 4-1 DPAH must NOT exist. GAC 2 PDIT 4-1 DPAH msut NOT exist. The corresponding circuit breaker or overload must NOT be tripped.
Building Heater	Adjust integral thermostat located on the heater to desired temperature in the treatment building. The corresponding circuit breaker must NOT be tripped.

Alarm Descriptions that affect process automation and shutdown equipment (Note: all other alarms are for notification purposes only – No equipment is shut down)

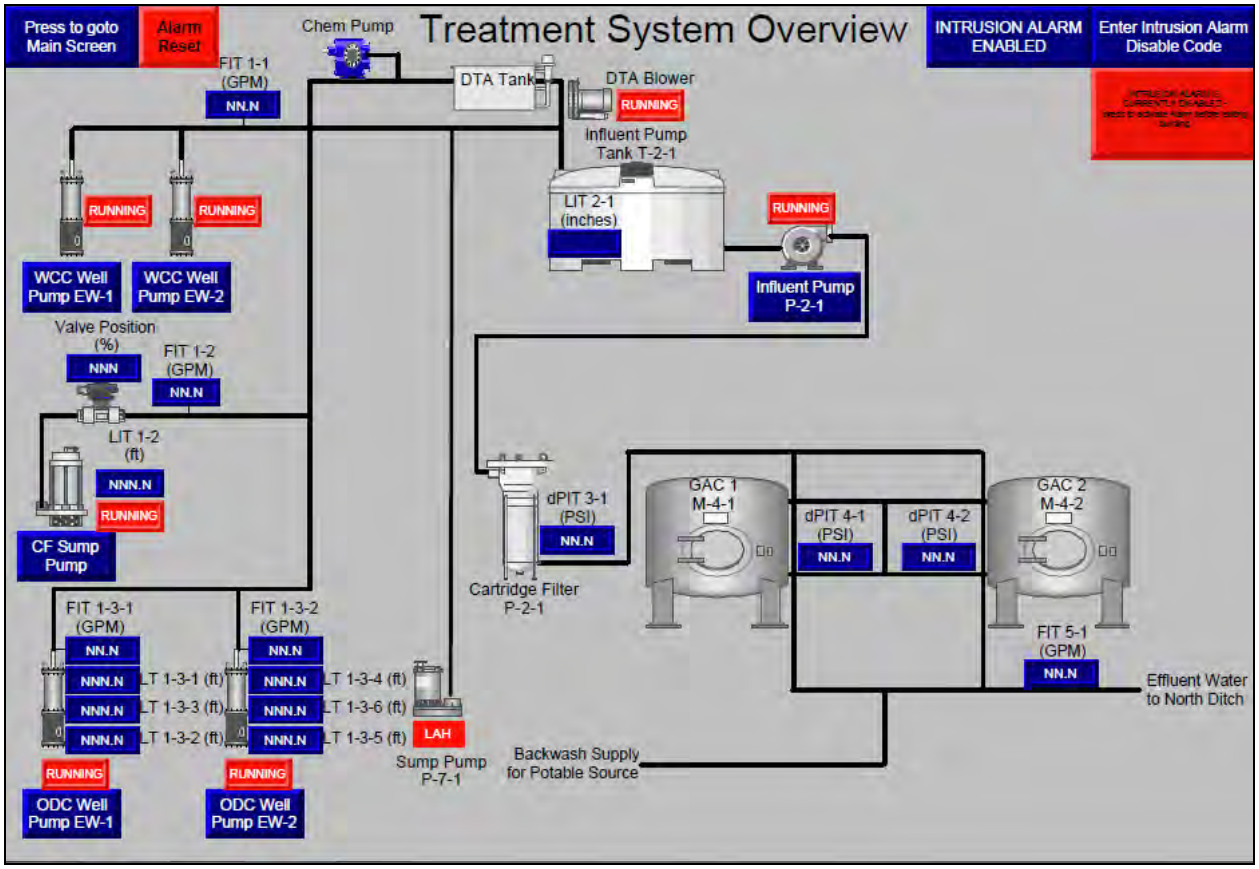
Control Device	Resultant Condition	Control Panel Indication
Effluent Flow Meter FIT 5-1 Failure	Shuts down all pumps Closes CF Control Valve FCV 1-2	Common pilot light illuminates, indication on OIT, and remote notification thru Webport initiates
Power Alarm JSL-10-1	Shuts down all pumps Closes CF Control Valve FCV 1-2	Common pilot light illuminates, indication on OIT, and remote notification thru Webport initiates
Building Sump Alarm LSH-7-1	Shuts down all pumps Closes CF Control Valve FCV 1-2	Common pilot light illuminates, indication on OIT, and remote notification thru Webport initiates
FIT 1-1 FALL	Shuts down WCC extraction wells	Common pilot light illuminates, indication on OIT, and remote notification thru Webport initiates
FIT 1-3-1 FALL	Shuts down ODC EW-1	Common pilot light illuminates, indication on OIT, and remote notification thru Webport initiates
FIT 1-3-2 FALL	Shuts down ODC EW-2	Common pilot light illuminates, indication on OIT, and remote notification thru Webport initiates
LIT 1-3-1 LAL	Shuts down ODC EW-1	Common pilot light illuminates, indication on OIT, and remote notification thru Webport initiates

LIT 1-3-1 LALL	Shuts down ODC EW-1	Common pilot light illuminates, indication on OIT, and remote notification thru Webport initiates
LIT 1-3-4 LAL	Shuts down ODC EW-2	Common pilot light illuminates, indication on OIT, and remote notification thru Webport initiates
LIT 1-3-4 LALL	Shuts down ODC EW-2	Common pilot light illuminates, indication on OIT, and remote notification thru Webport initiates
FIT 1-2 FALL	Shuts down CF Pump Closes CF Control Valve FCV 1-2	Common pilot light illuminates, indication on OIT, and remote notification thru Webport initiates
FIT 5-1 FALL	Shuts down Influent Tank Pump P-2-1	Common pilot light illuminates, indication on OIT, and remote notification thru Webport initiates
Influent Tank LIT 2-1 LAHH	Shuts down all pumps except Influent Tank Pump P-2-1 Closes CF Control Valve FCV 1-2	Common pilot light illuminates, indication on OIT, and remote notification thru Webport initiates
Cartridge Filter PDIT 3-1 DPAH	Shuts down Influent Tank Pump P-2-1	Common pilot light illuminates, indication on OIT, and remote notification thru Webport initiates
GAC 1 PDIT 4-1 DPAH	Shuts down Influent Tank Pump P-2-1	Common pilot light illuminates, indication on OIT, and remote notification thru Webport initiates
GAC 1 PDIT 4-2 DPAH	Shuts down Influent Tank Pump P-2-1	Common pilot light illuminates, indication on OIT, and remote notification thru Webport initiates
Influent Tank Pump Run Failure	Shuts down Influent Tank Pump P-2-1	Common pilot light illuminates, indication on OIT, and remote notification thru Webport initiates
Influent Tank Pump Fault	Shuts down Influent Tank Pump P-2-1	Common pilot light illuminates, indication on OIT, and remote notification thru Webport initiates
Influent Tank Level Transmitter LIT 2-1 failure	Shuts down all pumps Closes CF Control Valve FCV 1-2	Common pilot light illuminates, indication on OIT, and remote notification thru Webport initiates
Influent Tank LIT 2-1 LALL	Shuts down Influent Tank Pump P-2-1	Common pilot light illuminates, indication on OIT, and remote notification thru Webport initiates
DTA High Alarm	Shuts down all pumps and DTA blower	Common pilot light illuminates, indication on OIT, and remote notification thru Webport initiates

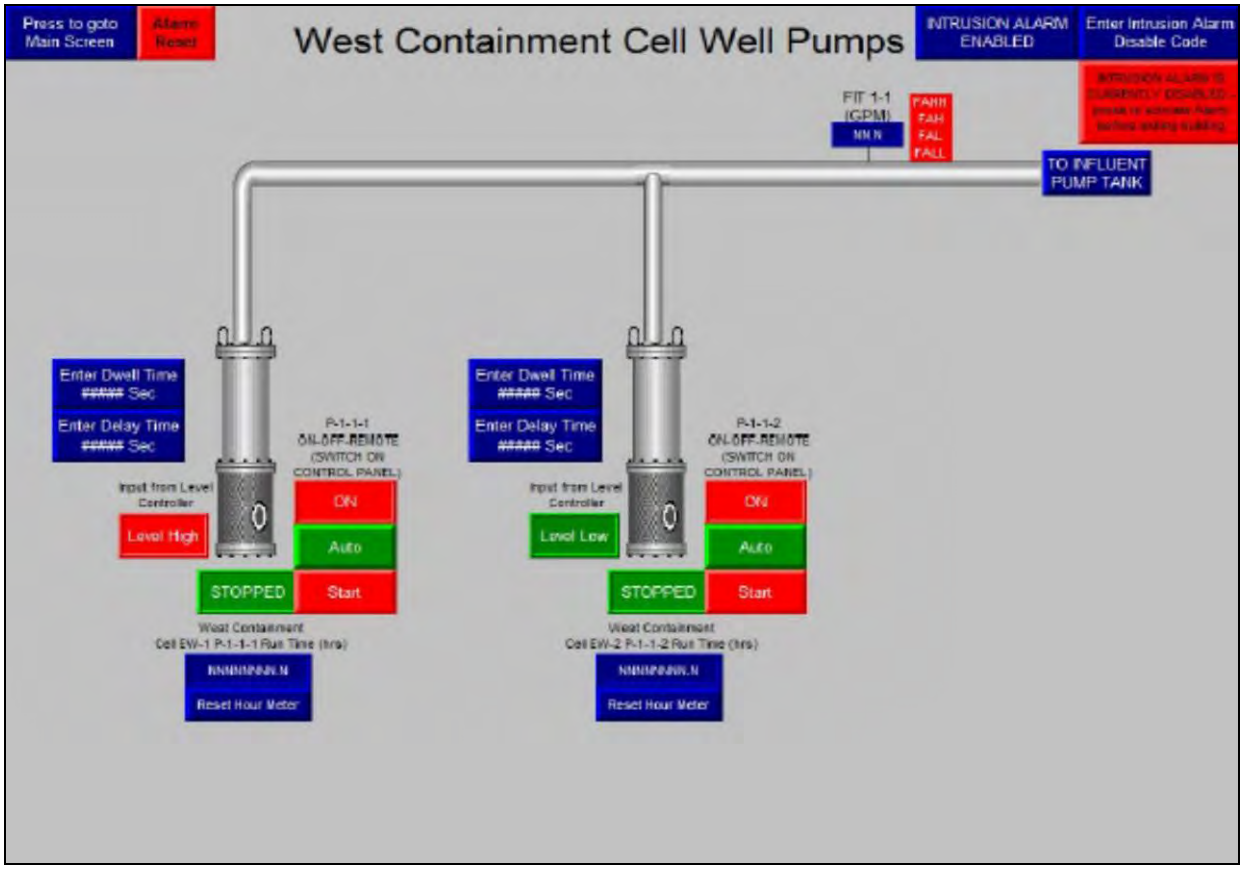
3. Screen Information and Description



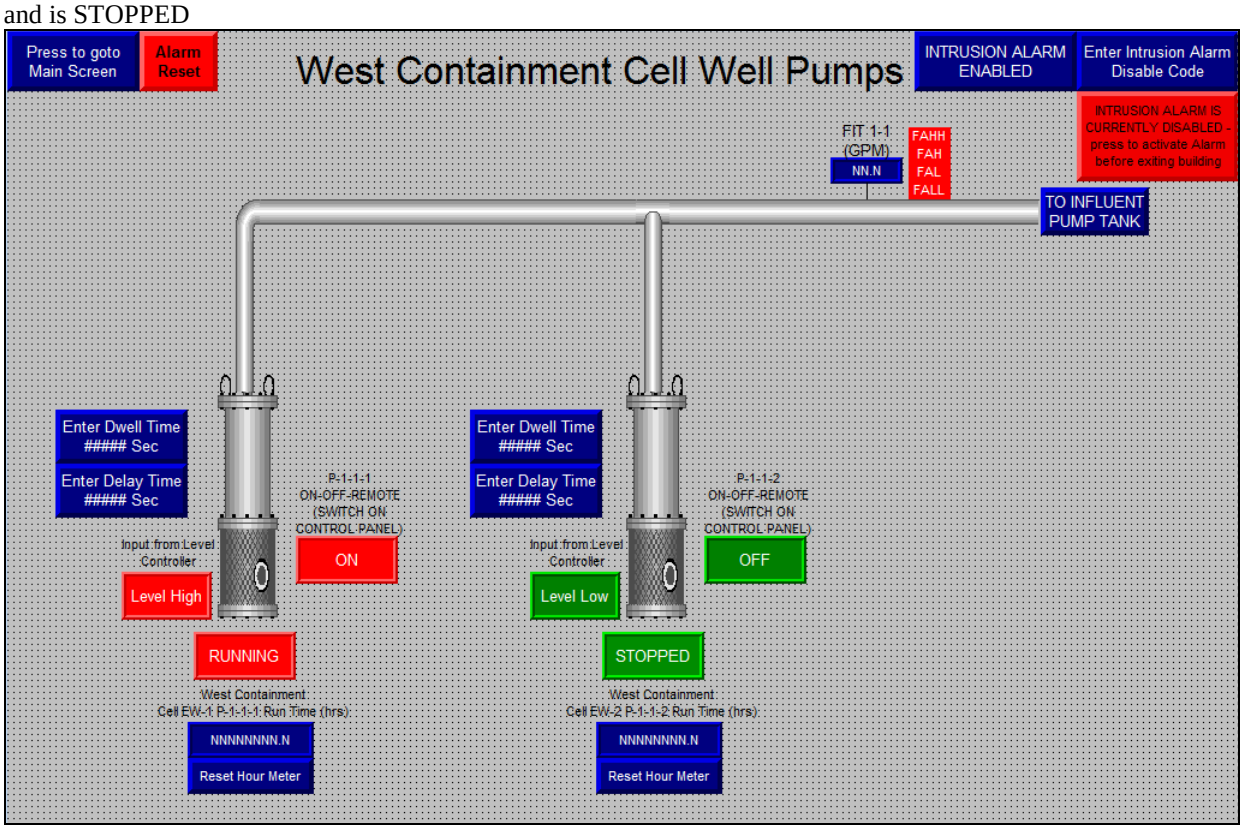
- Press the hidden "SHUTDOWN" button to stop the FactoryTalk view program from running. This hidden button is in the upper left corner of the display. This button should only be depressed if internal settings of the panelview are needed or if a new program needs to be loaded.
- Press the "P&ID OVERVIEW" button to goto the system process overview
- Press the "WEST CONTAINMENT WELL PUMPS" button to goto information specific to the West Containment Well Pumps
- Press the "CONSOLIDATION FACILITY SUMP" button to got information specific to the Consolidation Facility Sump Pump and Flow Control Valve
- Press the "ODC WELL PUMPS" button to goto information specific to the ODC Well Pumps
- Press the "WATER FLOW TOTAL" button to goto information indicating system total flows and minimum and maximum levels, flows, and pressures
- Press the "ALARM SETUP" button to goto information about the entry of setpoints for alarms in the system.
- Press the "ALARM BANNER" button to goto the Alarm Banner to view Active, Acknowledged, and time events of alarms
- Press the "ALARM HISTORY" button to goto information about alarms and the history of them
- Press the "ENTER CODE TO SETUP INTRUSION ALARM SETUP" button to allow access to the "INTRUSTION ALARM SETUP" button. The security code to access the Intrusion alarm setup is "abcd"
- Press the "INTRUSION ALARM DISABLE" to enter code to disable the intrusion alarm.
- Press the "INTRUSION ALARM IS CURRENTLY DISABLED" to start the timer to activate the intusion alarm. You will have "X" amount of time to exist the building before the alarm becomes active
- "INTRUSION ALARM ENABLED" will be diplayed when the alarm is enabled
- "INTRUSION ALARM EXIST" will be displayed when the intrustion alarm is active
- Press the "NON CRITICAL PARAMETERS" button to allow initial settings of various devices to be entered. Enter the code "Info" to allow these entries to be available for 2 hours.



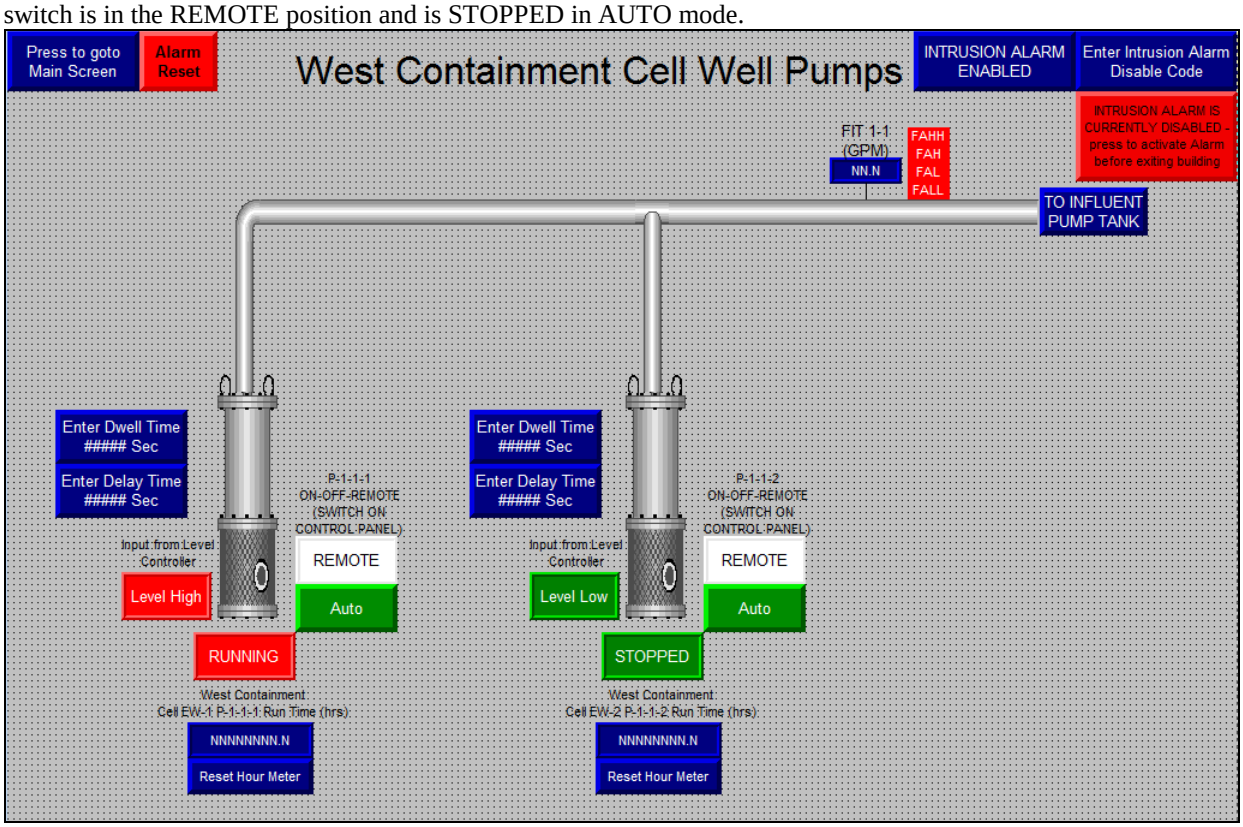
- This screen gives the system overview with basic process information indicated including pump run status indicated as “RUNNING” or “STOPPED” and process values
- Press the button near the associated equipment to jump to that equipments specific process page
- Press the “ALARM RESET” button to attempt to reset any alarms
- Press the “ALARM HISTORY” button to goto information about alarms and the history of alarms
- Press the “MAIN SCREEN” button to goto the main screen.
- Press the “ALARM RESET” button to attempt to reset any active alarm.
- Press the “INTRUSION ALARM DISABLE” to enter code to disable the intrusion alarm.
- Press the “INTRUSION ALARM IS CURRENTLY DISABLED” to start the timer to activate the intusion alarm. You will have “X” amount of time to exist the building before the alarm becomes active
- “INTRUSION ALARM ENABLED” will be diplayed when the alarm is enabled
- “INTRUSION ALARM EXIST” will be displayed when the intrustion alarm is active



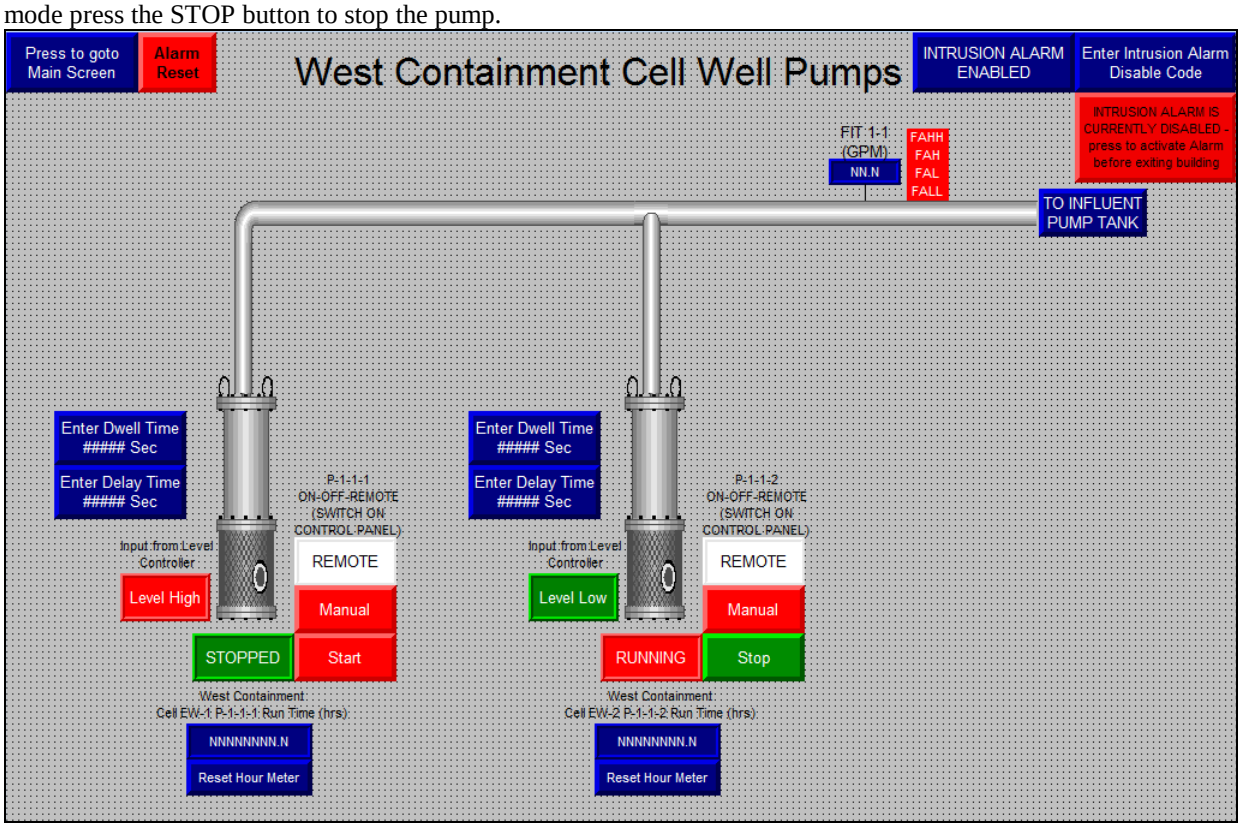
WCC EW-1 OOR switch in the ON position and is RUNNING. WCC EW-2 OOR switch is in the OFF position and is STOPPED



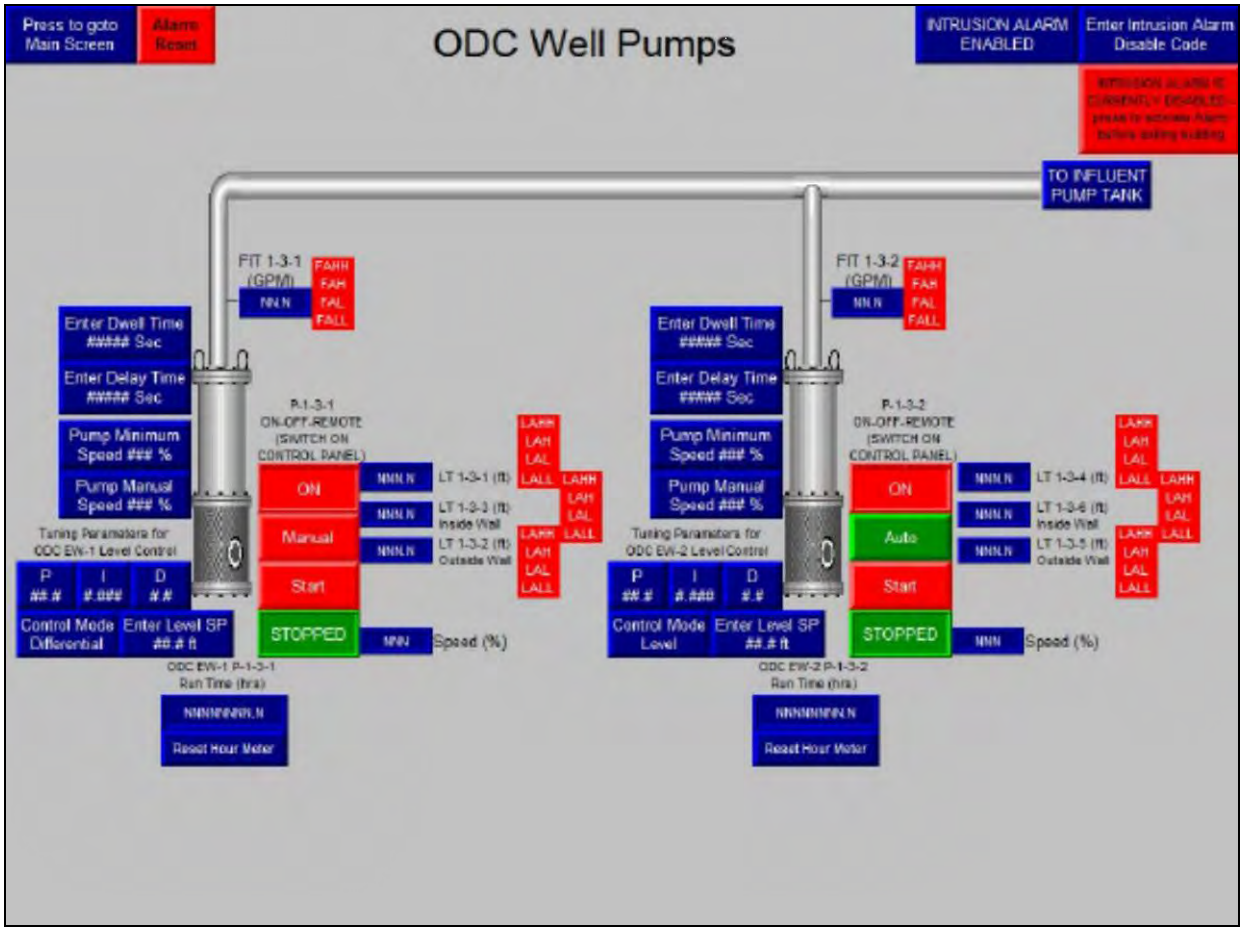
WCC EW-1 OOR switch in the REMOTE position and is RUNNING in AUTO mode. WCC EW-2 OOR switch is in the REMOTE position and is STOPPED in AUTO mode.



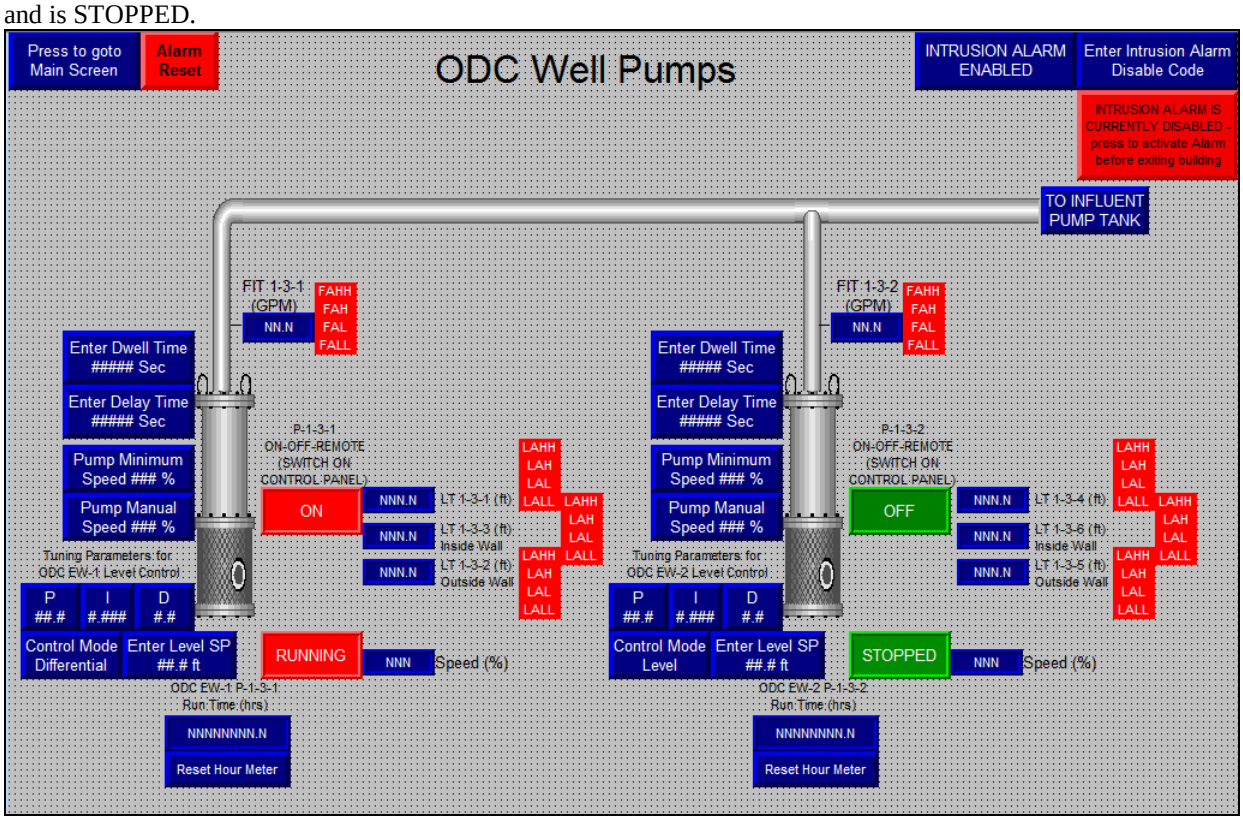
WCC EW-1 OOR switch in the REMOTE position and is STOPPED in MANUAL mode – press the START button to start the pump. WCC EW-2 OOR switch is in the REMOTE position and is RUNNING in MANUAL mode press the STOP button to stop the pump.



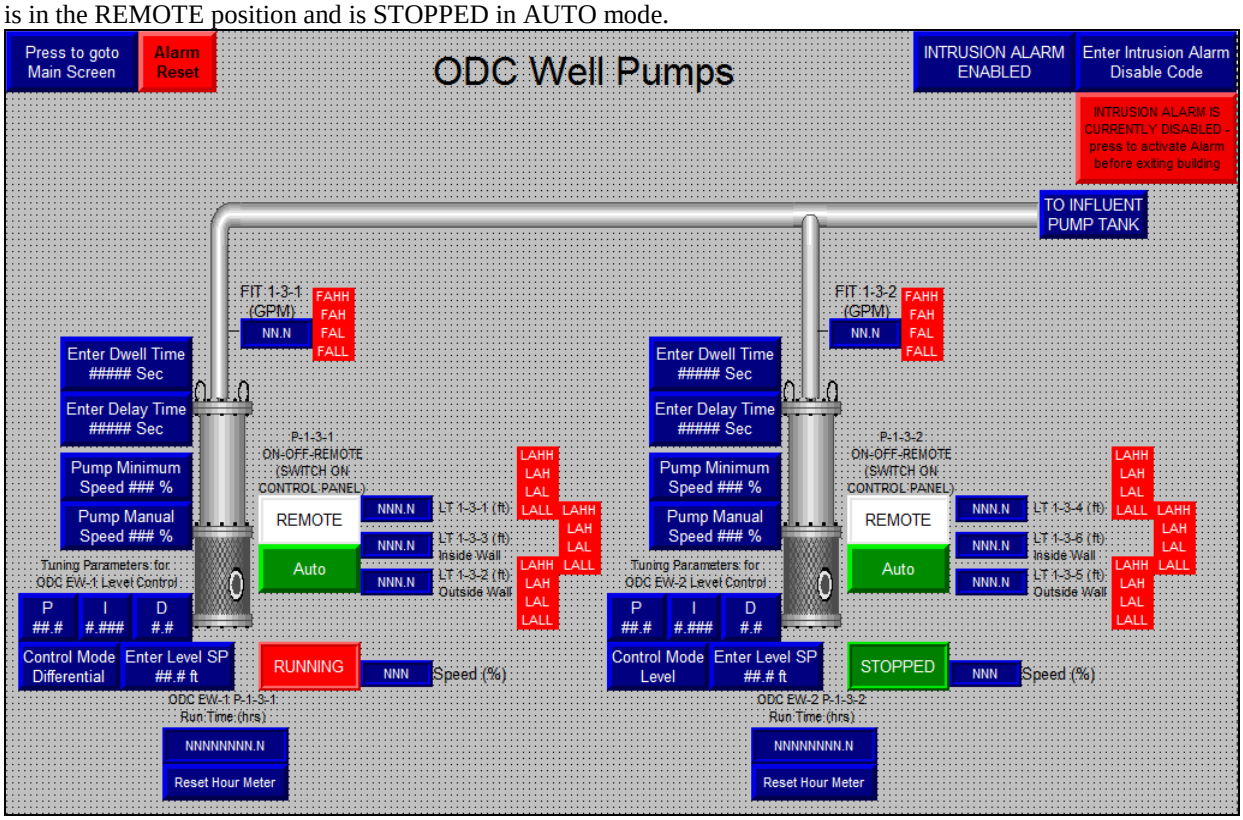
- Press the button to enter the appropriate well Dwell and Delay times. A delay timer will delay starting of the pump and will start counting after the pump has stopped. A dwell timer will delay stopping of the pump. The delay and dwell timers are adjustable and will be entered based on the pump supplier specifications for maximum starts per hour and minimum pump run time required to cool pump after starting. When set to zero the delay and dwell times will be disabled. Range is 0 – 2147483647 seconds.
- Enter the time in seconds. If button is not displayed, go to Main screen and enter depress NON CRITICAL INFO button and enter code.
- "ON", "OFF", or "REMOTE" is displayed based on the position of the three position switch on the front of the control panel.
- When the three position on the front of the control panel is in the "REMOTE" position, you may select "AUTO" or "MANUAL". Selecting "AUTO" allows the PLC to control the pump and will shut it off or turn it on based on the Process Operation Description document. Selecting "MANUAL" will allow a "START" and "STOP" button to be selected so the associated pump can be run manually. DANGER, this mode of operation bypasses all process safety interlocks and system shutdowns as described in the Process Operation Description document.
- The LEVEL HIGH/LEVEL LOW indicates if water is detected in the well. The pump will run when LEVEL HIGH is displayed and will be shut off if LEVEL LOW is displayed.
- Pump run time is displayed to monitor accumulated run time of the associated pump. Pump hours roll over at 999,999.9. Enter code "P-1-1-1" to reset the hour meter for EW-1
  Enter code "P-1-1-1" to reset the hour meter for EW-2
- Pump will be indicated as "RUNNING" or "STOPPED"
- Press the "MAIN SCREEN" button to goto the main screen.
- Press the "TO INFLUENT PUMP TANK" button to goto the treatment building screen.
- Press the "ALARM RESET" button to attempt to reset any active alarm.
- Press the "INTRUSION ALARM DISABLE" to enter code to disable the intrusion alarm.
- Press the "INTRUSION ALARM IS CURRENTLY DISABLED" to start the timer to activate the intusion alarm. You will have "X" amount of time to exist the building before the alarm becomes active
- "INTRUSION ALARM ENABLED" will be diplayed when the alarm is enabled
- "INTRUSION ALARM EXIST" will be displayed when the intrustion alarm is active.



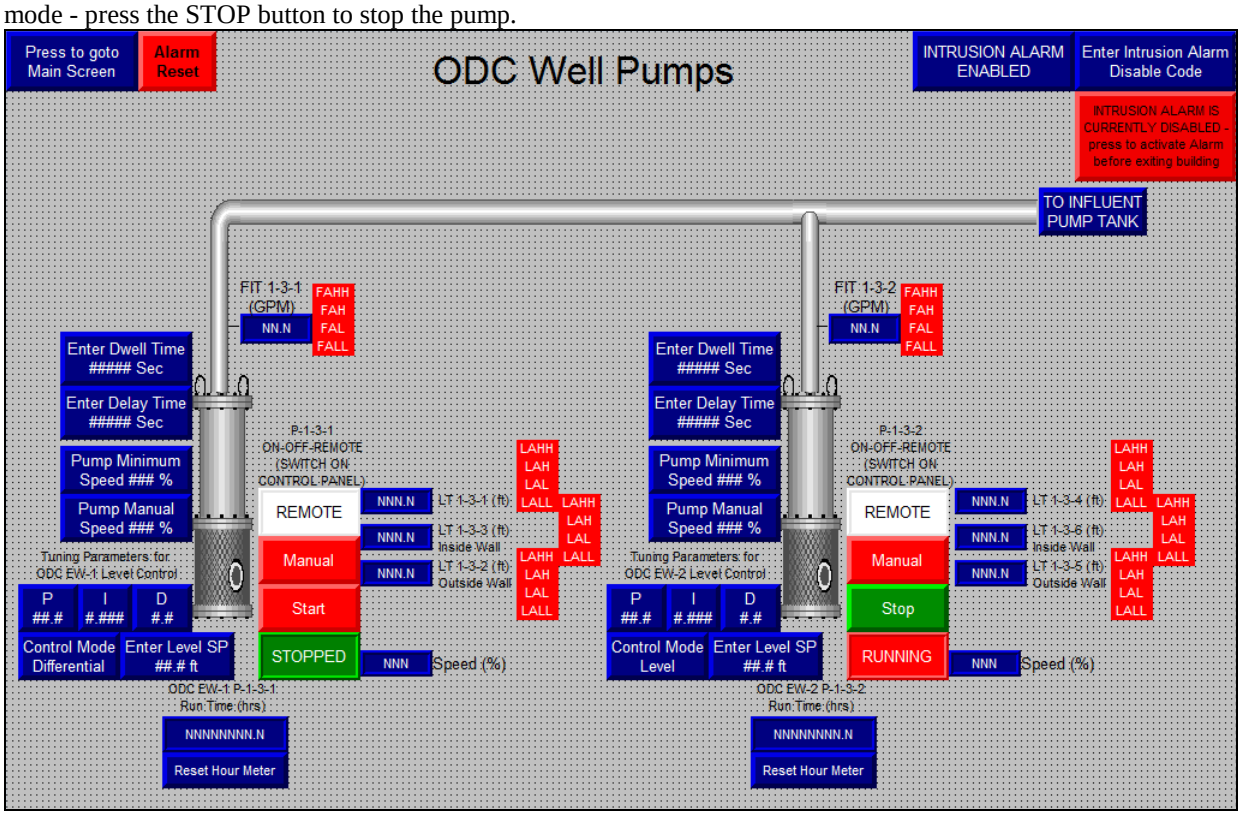
ODC EW-1 OOR switch in the ON position and is RUNNING. ODC EW-2 OOR switch is in the OFF position and is STOPPED.



ODC EW-1 OOR switch in the REMOTE position and is RUNNING in AUTO mode. ODC EW-2 OOR switch is in the REMOTE position and is STOPPED in AUTO mode.

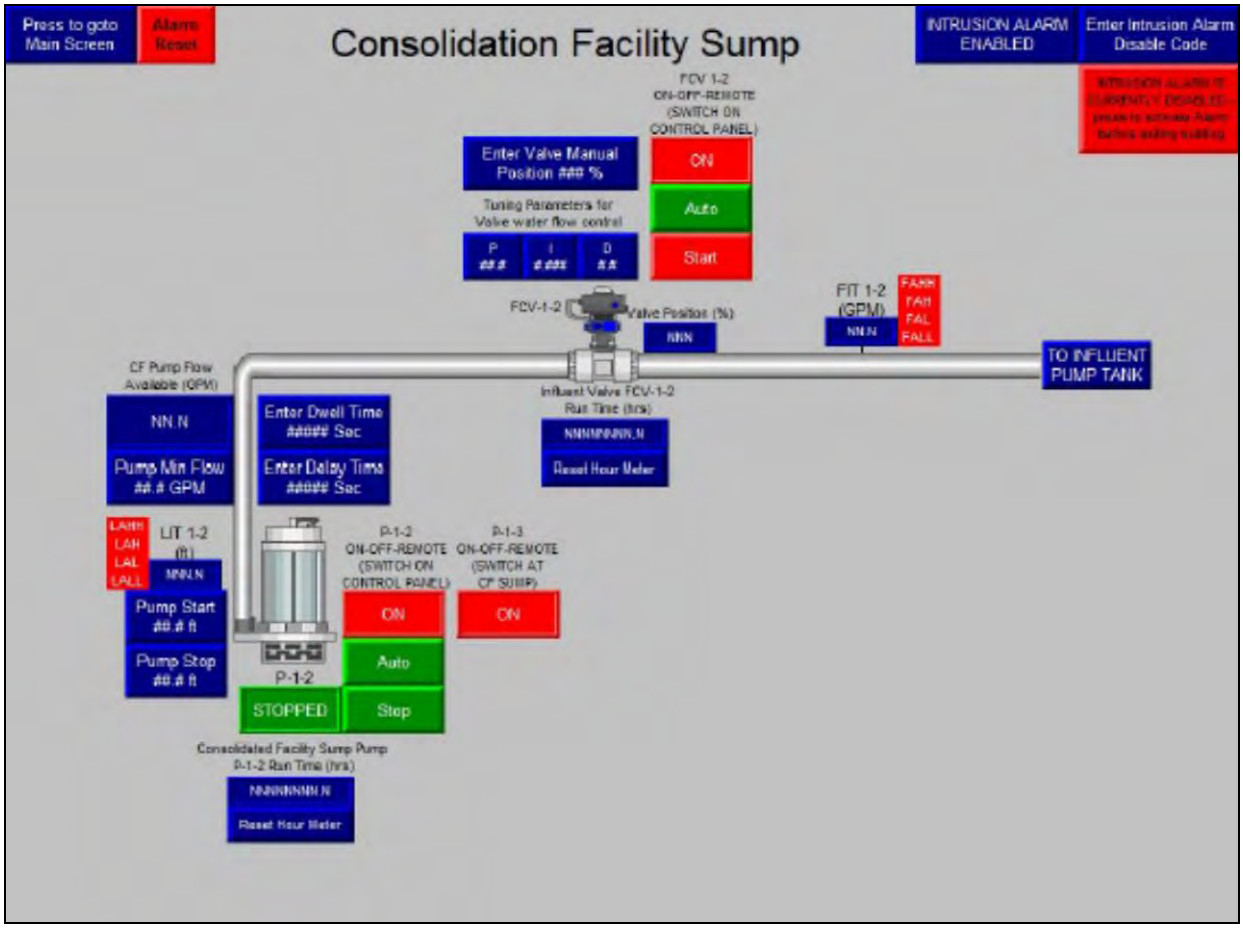


ODC EW-1 OOR switch in the REMOTE position and is STOPPED in MANUAL mode – press the START button to start the pump. ODC EW-2 OOR switch is in the REMOTE position and is RUNNING in MANUAL mode - press the STOP button to stop the pump.

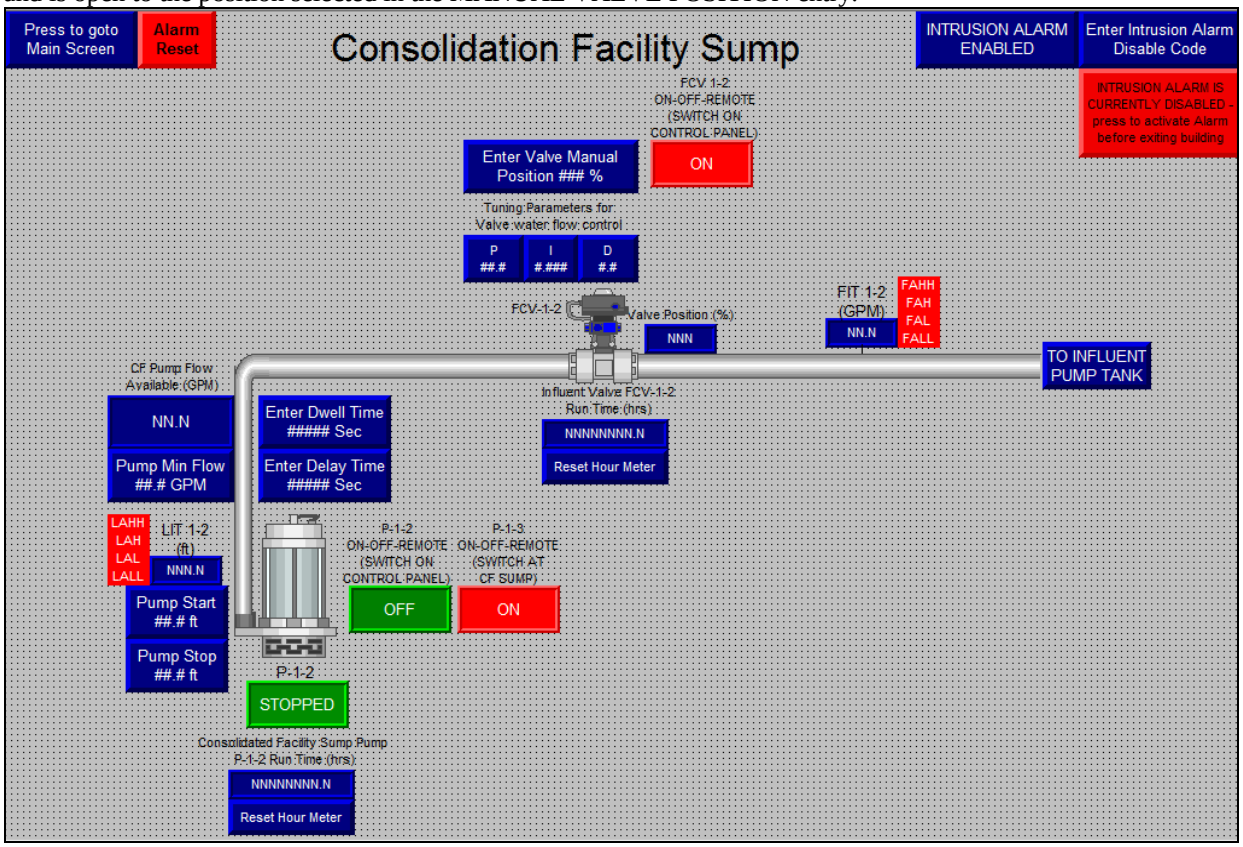


- LIT 1-3-1 level is indicated
- LIT 1-3-2 level is indicated
- LIT 1-3-3 level is indicated
- FIT 1-3-1 flow rate is indicated
- ODC EW-1 speed feedback is indicated
- LIT 1-3-4 level is indicated
- LIT 1-3-5 level is indicated
- LIT 1-3-6 level is indicated
- FIT 1-3-2 flow rate is indicated
- ODC EW-2 speed feedback is indicated
- LIT 1-3-1 LALL, LAL, LAH, and LAHH are indicated if active
- LIT 1-3-2 LALL, LAL, LAH, and LAHH are indicated if active
- LIT 1-3-3 LALL, LAL, LAH, and LAHH are indicated if active
- FIT 1-3-1 FALL, FAL, FAH, and FAHH are indicated if active
- LIT 1-3-4 LALL, LAL, LAH, and LAHH are indicated if active
- LIT 1-3-5 LALL, LAL, LAH, and LAHH are indicated if active
- LIT 1-3-6 LALL, LAL, LAH, and LAHH are indicated if active
- FIT 1-3-2 FALL, FAL, FAH, and FAHH are indicated if active
- Press the button to enter the appropriate well Dwell and Delay times. A delay timer will delay starting of the pump and will start counting after the pump has stopped. A dwell timer will delay stopping of the pump. The delay and dwell timers are adjustable and will be entered based on the pump supplier specifications for maximum starts per hour and minimum pump run time required to cool pump after starting. When set to zero the delay and dwell times will be disabled. Range is 0 – 2147483647 seconds.
- Press the “MIN SPEED” to enter a speed at which the ODC wells shut off. They will remain off until a start speed is reached via the PID loop. This parameter is determined from the ODC Well Pump manufacturer. See ODC Well Pump manual for recommended setting. If button is not displayed, go to Main screen and enter depress “NON CRITICAL INFO” button and enter code.
- “ON”, “OFF”, or “REMOTE” is displayed based on the position of the three position switch on the front of the control panel associated with that piece of equipment.
- When the three position on the front of the control panel is in the “REMOTE” position, you may select “AUTO” or “MANUAL”. Selecting “AUTO” allows the PLC to control that piece of equipment and will shut it off or turn it on based on the Process Operation Description document. Selecting “MANUAL” will allow a “START” and “STOP” button to be selected so the associated pump can be run manually. DANGER, this mode of operation bypasses all process safety interlocks and system shutdowns as described in the Process Operation Description document.
- While in the “ON” position or “REMOTE” position in the “MANUAL” mode, you may enter a manual speed from 0-100%
- While in the “REMOTE” position in the “AUTO” mode, you may adjust the “P”, “I”, and “D” parameters to modify the control of the associated ODC Well Pump.
- Press the “CONTROL MODE” button to select between “DIFFERENTIAL” and “LEVEL” control for the associated ODC Well Pump
- The ODC EW-1 will run and maintain the level setpoint entered in the “LEVEL SETPOINT” button when “LEVEL” mode is selected, the three position switch is in the “REMOTE” and “AUTO” is selected for ODC EW-1.
- The ODC EW-1 will run and maintain the level differential setpoint entered in the “DIFFERENTIAL SETPOINT” button when “DIFFERENTIAL” mode is selected, the three position switch is in the “REMOTE” and “AUTO” is selected for ODC EW-1.
- The ODC EW-2 will run and maintain the level setpoint entered in the “LEVEL SETPOINT” button when “LEVEL” mode is selected, the three position switch is in the “REMOTE” and “AUTO” is selected for ODC EW-2.
- The ODC EW-2 will run and maintain the level differential setpoint entered in the “DIFFERENTIAL SETPOINT” button when “DIFFERENTIAL” mode is selected, the three position switch is in the “REMOTE” and “AUTO” is selected for ODC EW-2.

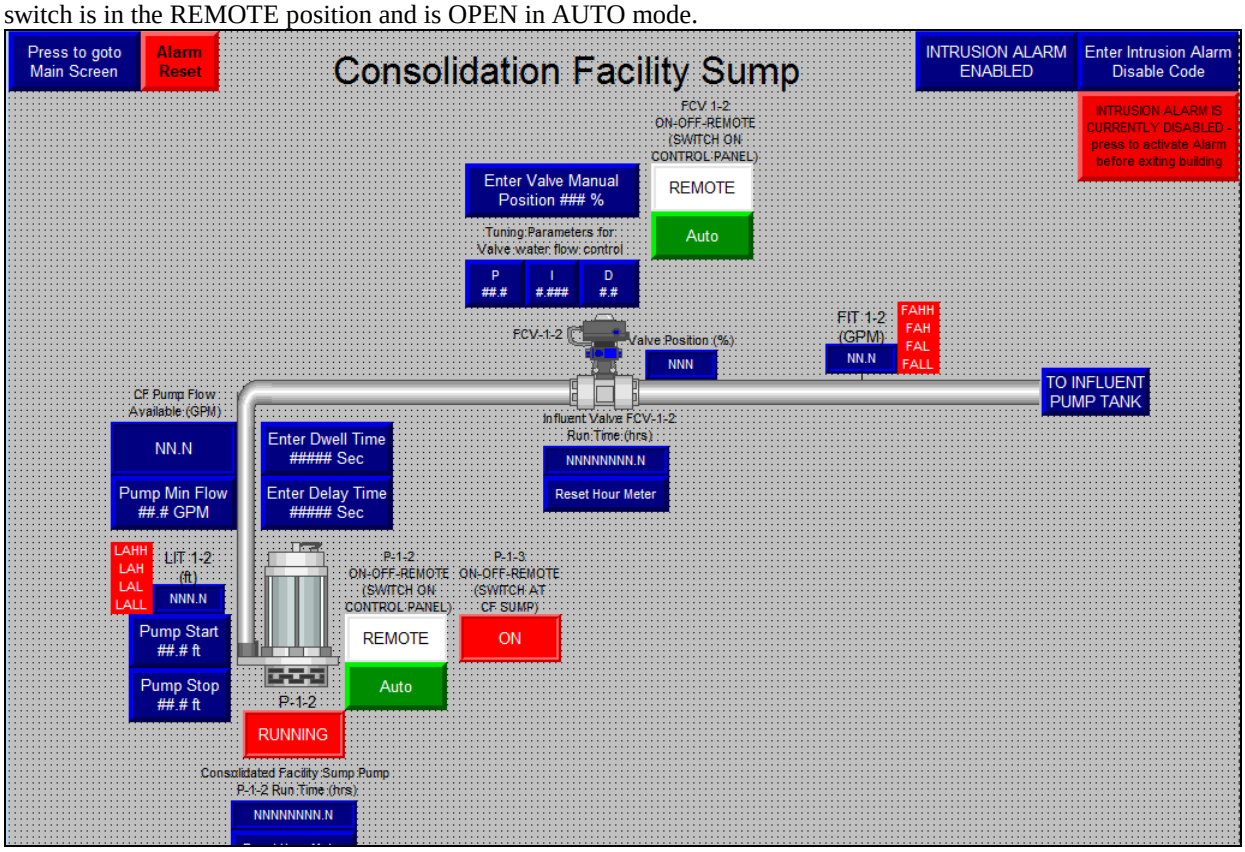
- Pump run time is displayed to monitor accumulated run time of the associated pump. Pump hours roll over at 999,999.9. Enter code “P-3-1” to reset the hour meter for ODC EW-1 and enter code “P-3-2” to reset the hour meter for ODC EW-2
- Pump will be indicated as “RUNNING” or “STOPPED”
- Press the “MAIN SCREEN” button to goto the main screen.
- Press the “TO INFLUENT PUMP TANK” button to goto the treatment building screen.
- Press the “ALARM RESET” button to attempt to reset any active alarm.
- Press the “TO INFLUENT PUMP TANK” to goto that screen.
- Press the “INTRUSION ALARM DISABLE” to enter code to disable the intrusion alarm.
- Press the “INTRUSION ALARM IS CURRENTLY DISABLED” to start the timer to activate the intusion alarm. You will have “X” amount of time to exist the building before the alarm becomes active.
- “INTRUSION ALARM ENABLED” will be diplayed when the alarm is enabled.
- “INTRUSION ALARM EXIST” will be displayed when the intrustion alarm is active.



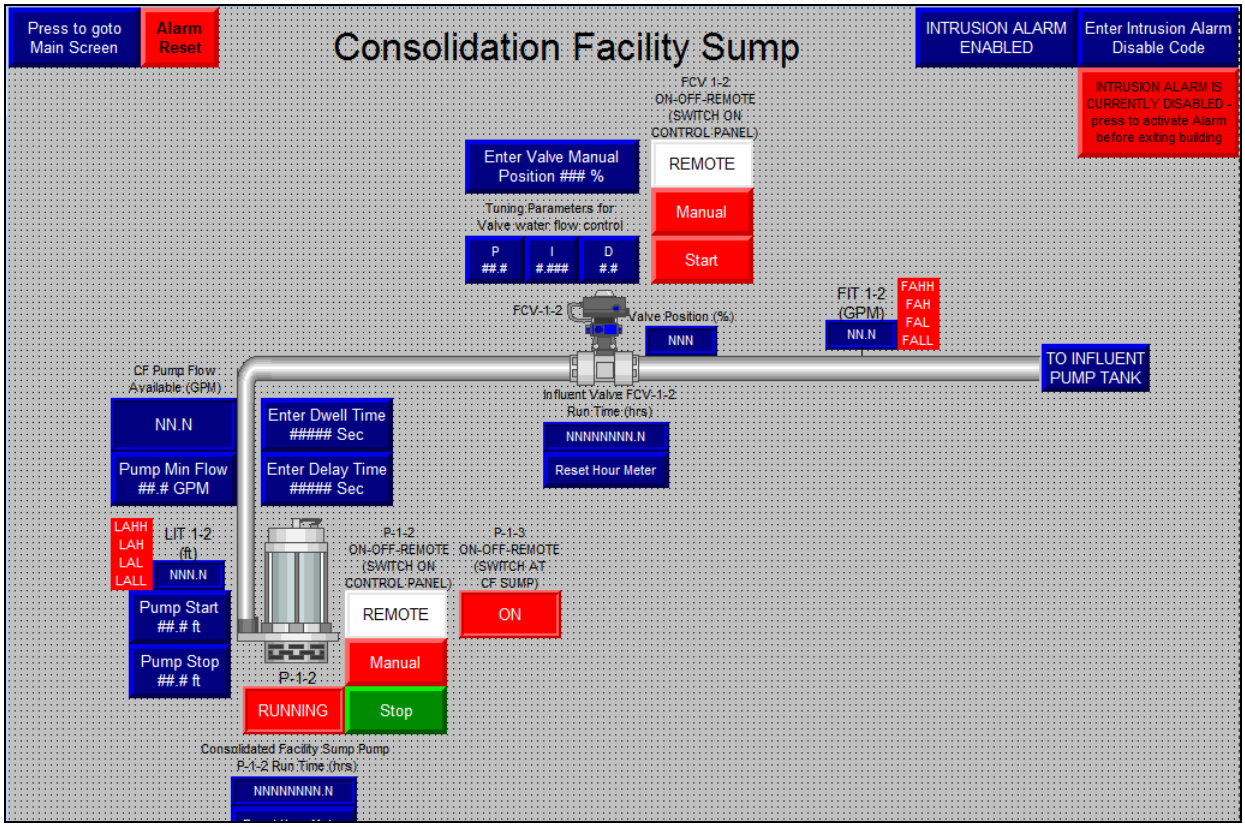
CF Sump Pump OOR switch in the OFF position and is STOPPED. FCV 1-2 OOR switch is in the ON position and is open to the position selected in the MANUAL VALVE POSITION entry.



CF Sump Pump OOR switch in the REMOTE position and is RUNNING in AUTO mode. FCV 1-2 Valve OOR switch is in the REMOTE position and is OPEN in AUTO mode.

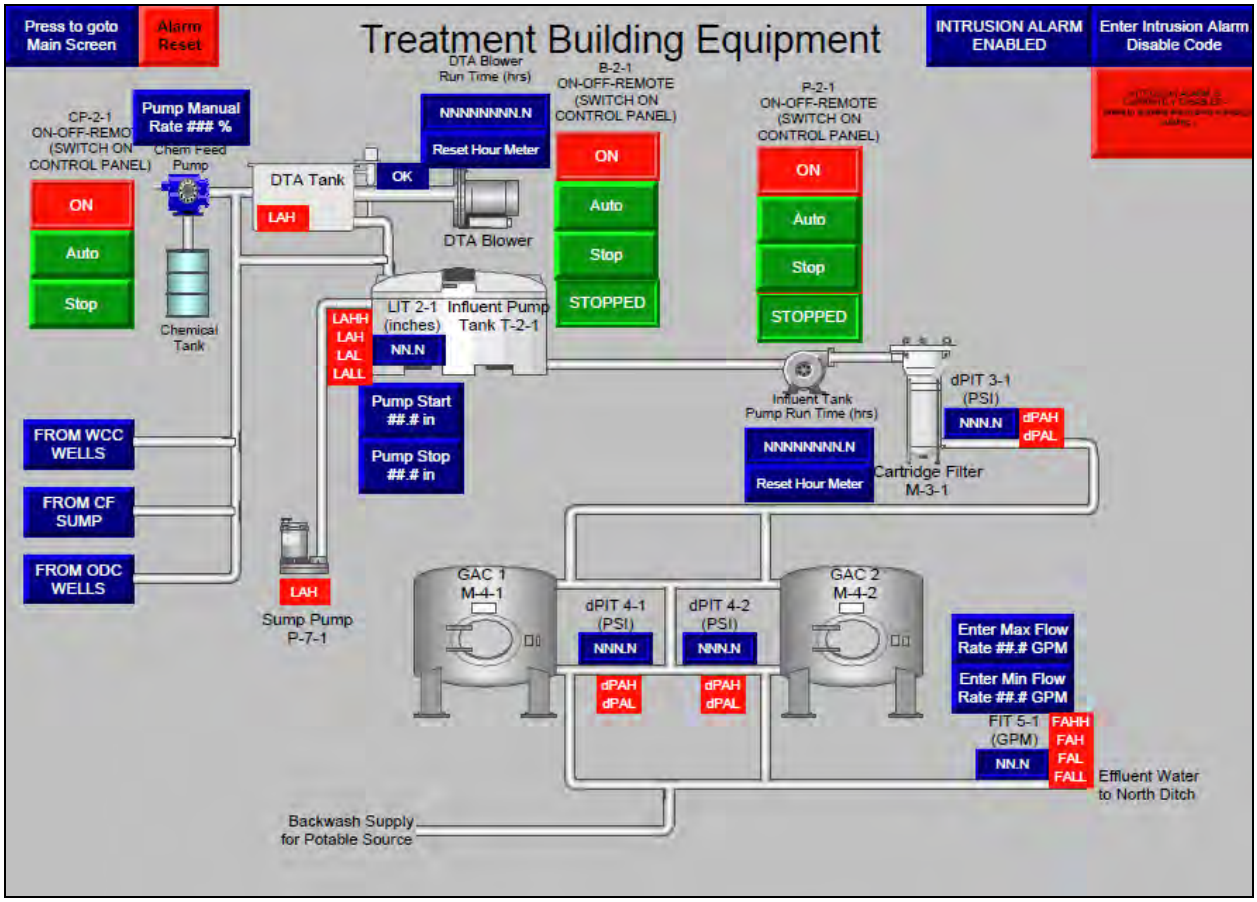


CF Sump Pump OOR switch in the REMOTE position and is STOPPED in MANUAL mode – press the START button to start the pump. FCV 1-2 Valve OOR switch is in the REMOTE position and is OPEN in MANUAL mode and is open to the position selected in the MANUAL VALVE POSITION entry.

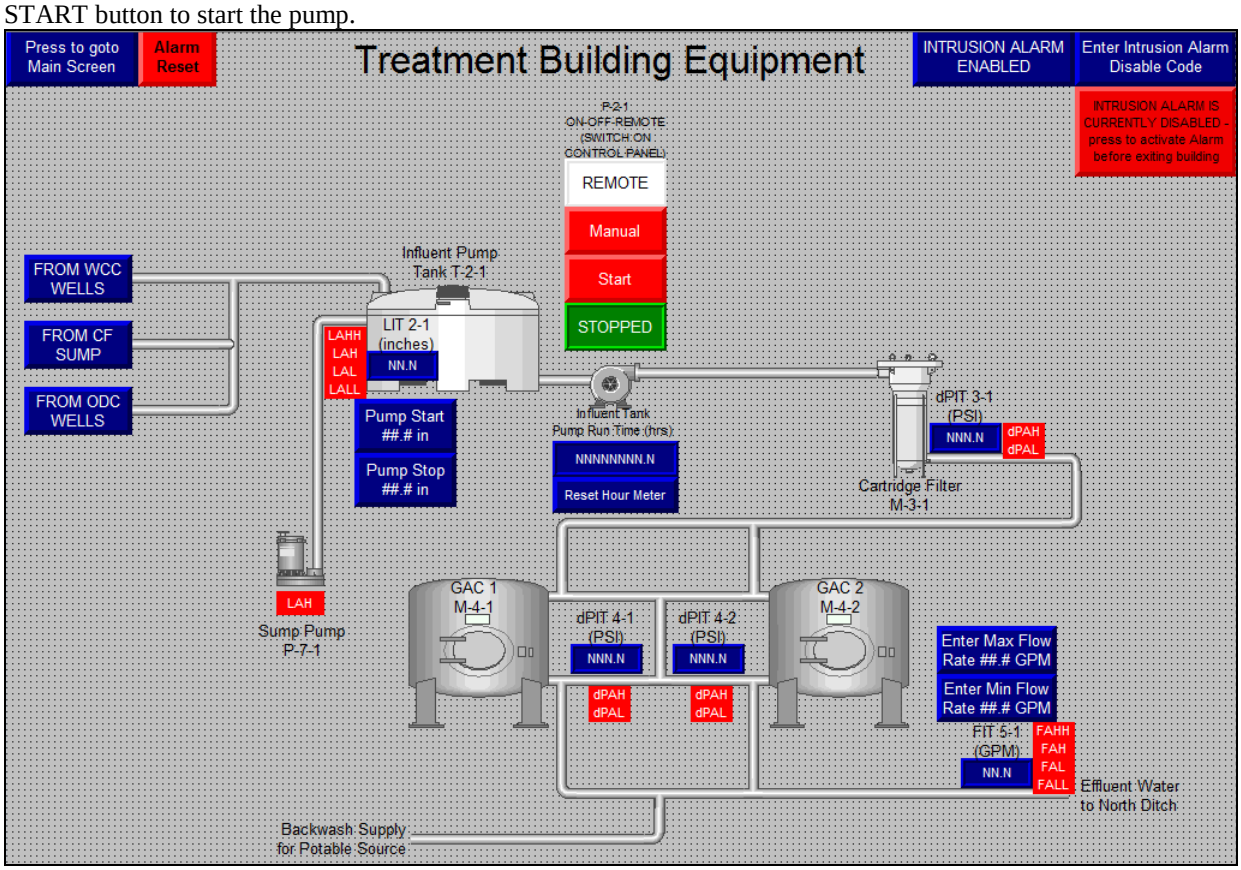


- LIT 1-2 level is indicated
- FIT 1-2 flow rate is indicated
- CF Valve position is indicated
- CF Sump LALL, LAL, LAH, and LAHH are indicated if active
- FIT 1-2 FALL, FAL, FAH, and FAHH are indicated if active
- CF SUMP AVAILABLE flow is determined by subtracting WCC flow and ODC flows from the system disired flow rate entered (located on Treatment Building screen)
- CF Sump Pump remote three position switch position is indicated. Depending on the position of the switch, “ON”, “OFF”, or “REMOTE” may be shown.
- Press the button to enter the appropriate well Dwell and Delay times. A delay timer will delay starting of the pump and will start counting after the pump has stopped. A dwell timer will delay stopping of the pump. The delay and dwell timers are adjustable and will be entered based on the pump supplier specifications for maximum starts per hour and minimum pump run time required to cool pump after starting. When set to zero the delay and dwell times will be disabled. Range is 0 – 2147483647 seconds.
- Press the “PUMP START” and “PUMP STOP” buttons to enter the appropriate level to start and stop the CF Sump Pump. Range of entry is 584.39 to 595.39ft..
- “ON”, “OFF”, or “REMOTE” is displayed based on the position of the three position switch on the front of the control panel associated with that piece of equipment.
- When the three position on the front of the control panel is in the “REMOTE” position, you may select “AUTO” or “MANUAL”. Selecting “AUTO” allows the PLC to control that piece of equipment and will shut it off or turn it on based on the Process Operation Description document. Selecting “MANUAL” will allow a “START” and “STOP” button to be selected so the associated pump can be run manually. DANGER, this mode of operation bypasses all process safety interlocks and system shutdowns as described in the Process Operation Description document.
- While in the “ON” position or “REMOTE” position in the “MANUAL” mode, you may enter a manual valve position from 0-100%
- While in the “REMOTE” position in the “AUTO” mode, you may adjust the “P”, “I”, and “D” parameters to modify the control of the CF Valve.

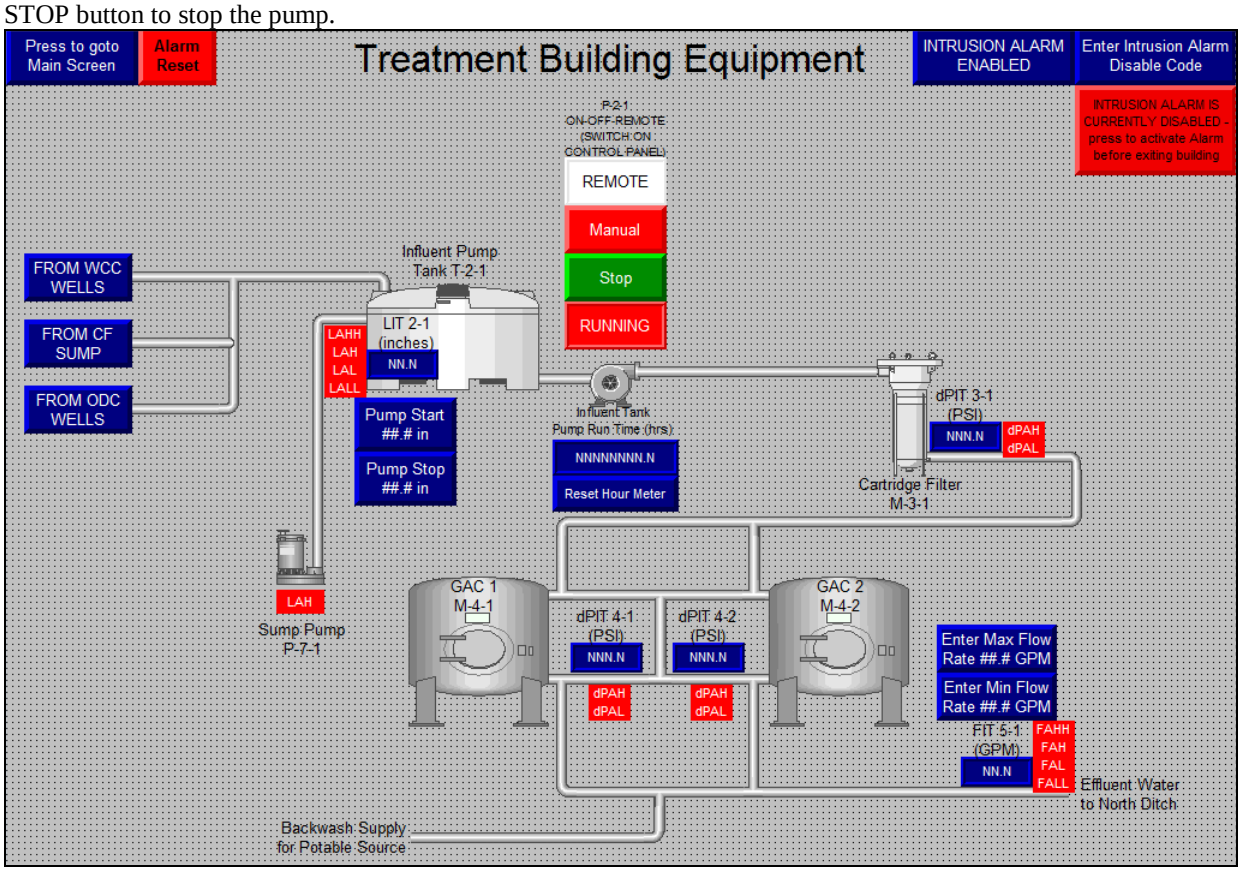
- Pump run time is displayed to monitor accumulated run time of the associated pump. Pump and valve hours roll over at 999,999.9. Enter code “P-1-2” to reset the hour meter for CF Sump Pump and enter code “FCV-1-2” to reset the hour meter for CF Sump Pump
- Pump will be indicated as “RUNNING” or “STOPPED”
- Press the “MAIN SCREEN” button to goto the main screen.
- Press the “TO INFLUENT PUMP TANK” button to goto the treatment building screen.
- Press the “ALARM RESET” button to attempt to reset any active alarm.
- Press the “TO INFLUENT PUMP TANK” to goto that screen
- Press the “INTRUSION ALARM DISABLE” to enter code to disable the intrusion alarm.
- Press the “INTRUSION ALARM IS CURRENTLY DISABLED” to start the timer to activate the intusion alarm. You will have “X” amount of time to exist the building before the alarm becomes active
- “INTRUSION ALARM ENABLED” will be diplayed when the alarm is enabled
- “INTRUSION ALARM EXIST” will be displayed when the intrustion alarm is active



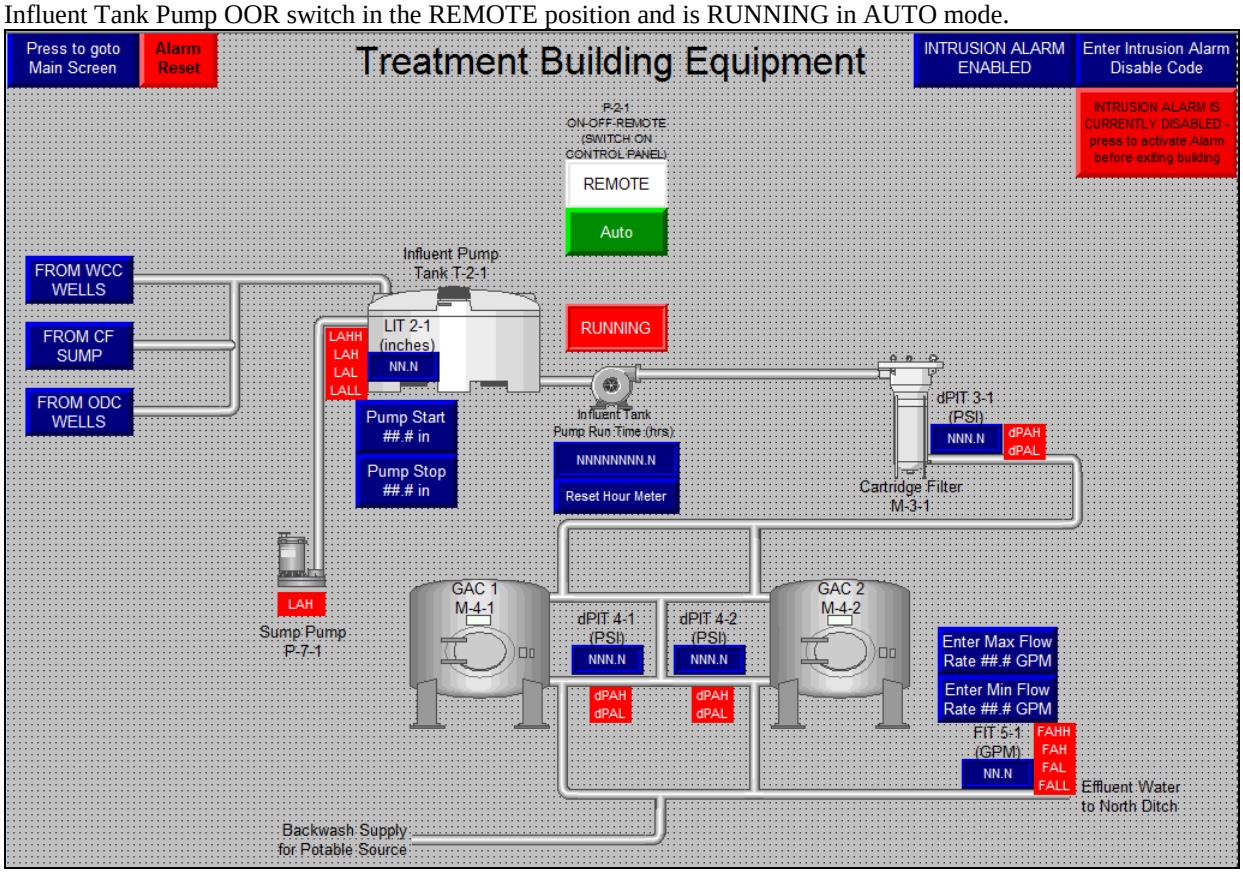
Influent Tank Pump OOR switch in the REMOTE position and is STOPPED in MANUAL mode – press the START button to start the pump.



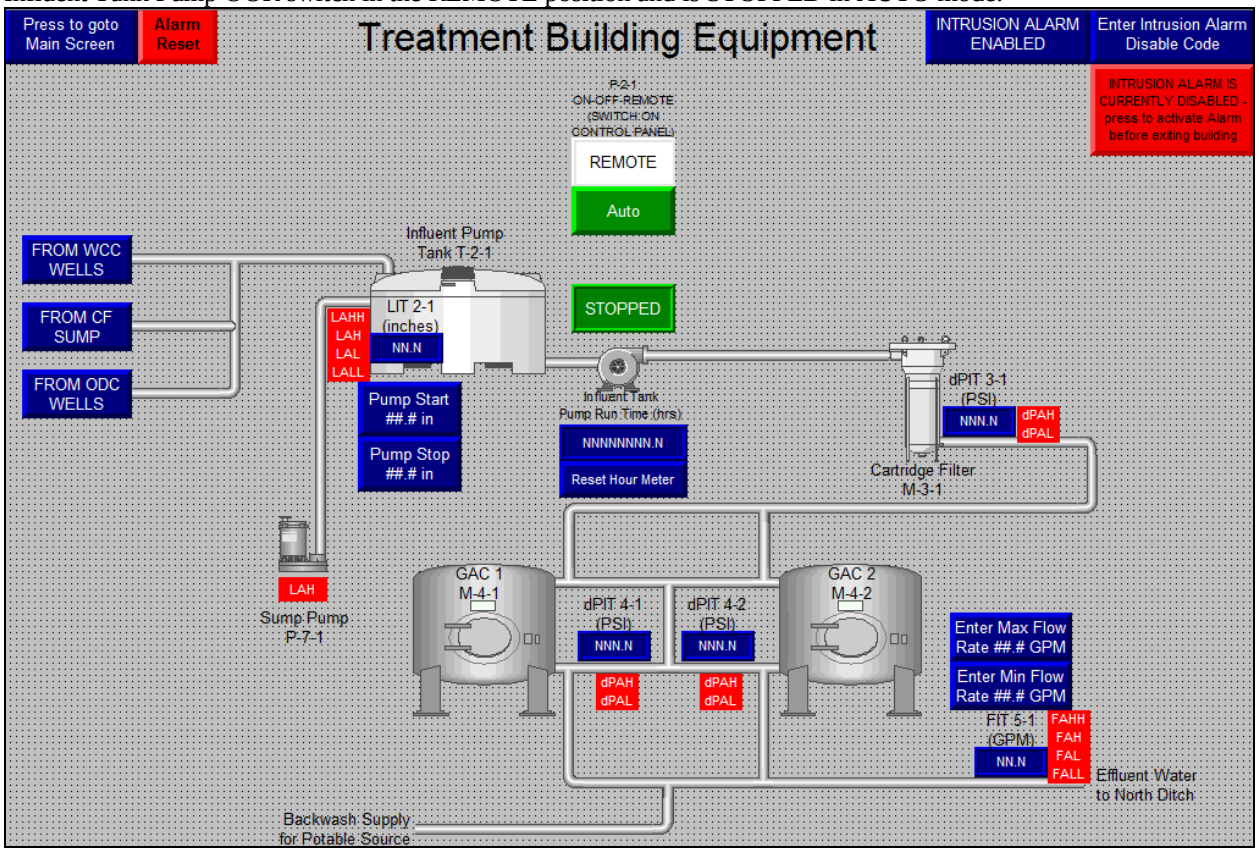
Influent Tank Pump OOR switch in the REMOTE position and is RUNNING in MANUAL mode – press the STOP button to stop the pump.



Influent Tank Pump OOR switch in the REMOTE position and is RUNNING in AUTO mode.

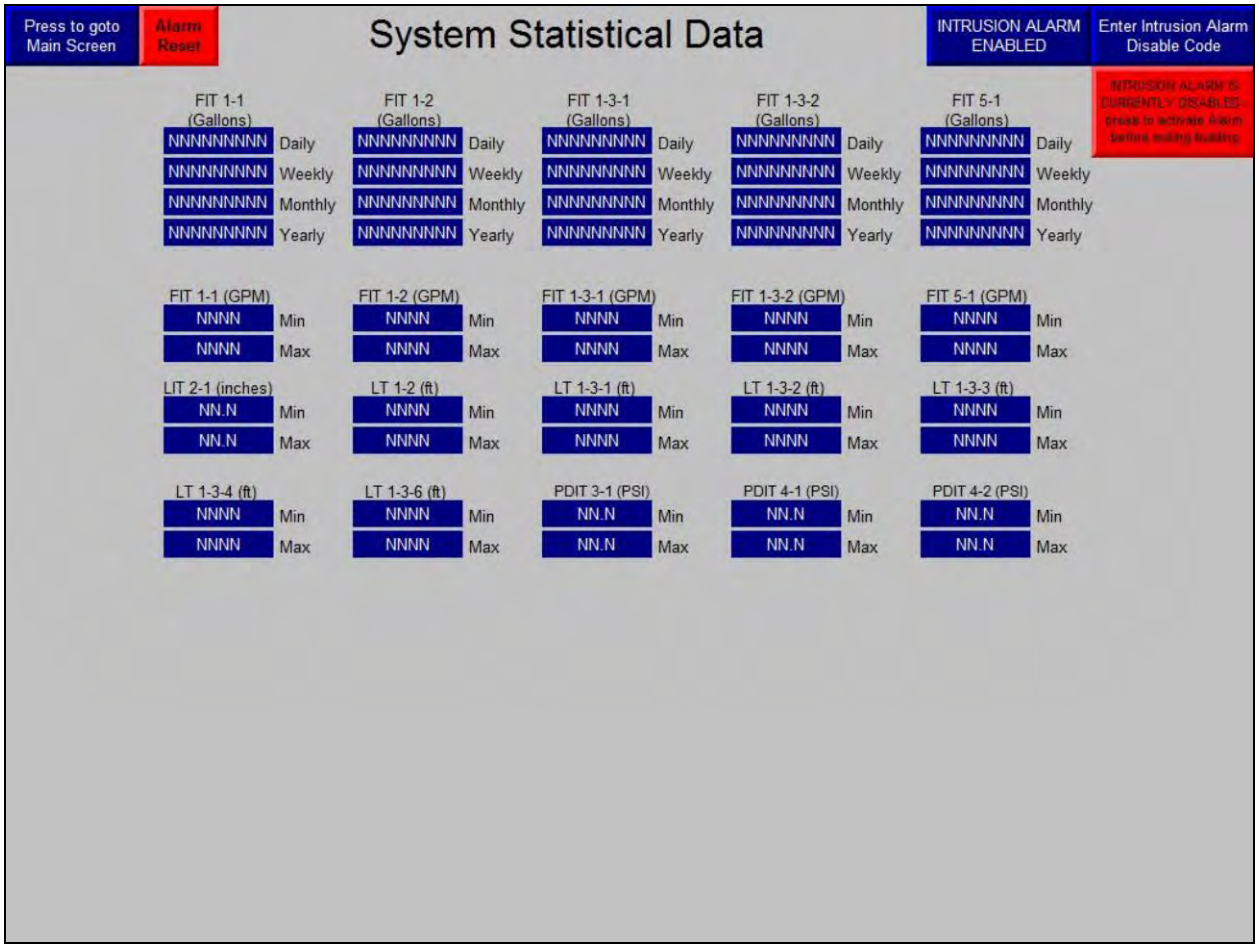


Influent Tank Pump OOR switch in the REMOTE position and is STOPPED in AUTO mode.

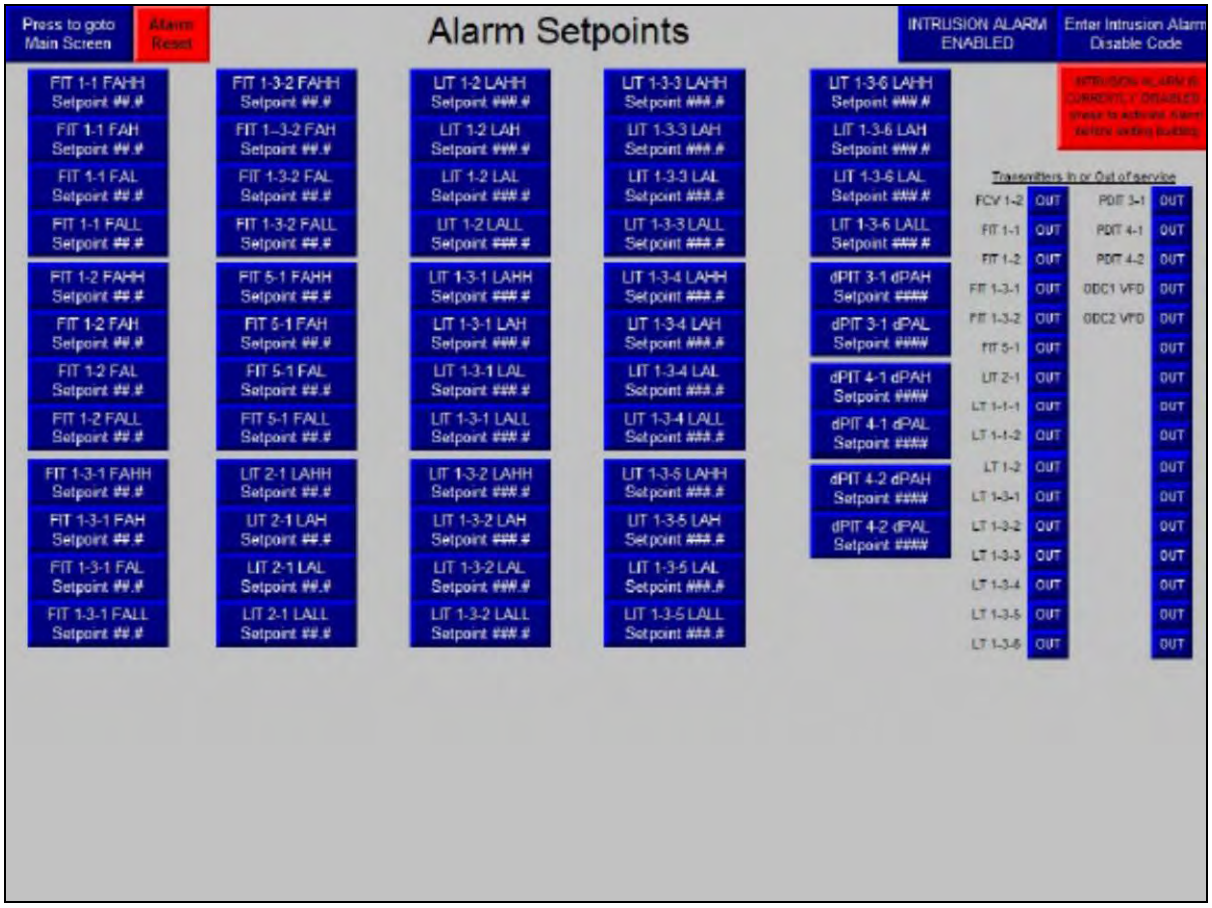


- LIT 2-1 level is indicated
- dPIT 3-1 pressure is indicated
- dPIT 4-1 pressure is indicated
- dPIT 4-2 is indicated
- FIT 5-1 flow rate is indicated
- LIT 2-1 LALL, LAL, LAH, and LAHH are indicated if active
- dPIT 3-1 dPAL and dPAH are indicated if active
- dPIT 4-1 dPAL and dPAH are indicated if active
- dPIT 4-2 dPAL and dPAH are indicated if active
- FIT 5-1 FALL, FAL, FAH, and FAHH are indicated if active
- Press the “PUMP START” and “PUMP STOP” buttons to enter the appropriate level to start and stop the Influent Tank Pump. Range of entry is from 0 to 38”
- “ON”, “OFF”, or “REMOTE” is displayed based on the position of the three position switch on the front of the control panel associated with that piece of equipment.
- When the three position on the front of the control panel is in the “REMOTE” position, you may select “AUTO” or “MANUAL”. Selecting “AUTO” allows the PLC to control the Influent Tank Pump and will shut it off or turn it on based on the Process Operation Description document. Selecting “MANUAL” will allow a “START” and “STOP” button to be selected so the Influent Tank Pump can be run manually. DANGER, this mode of operation bypasses all process safety interlocks and system shutdowns as described in the Process Operation Description document.
- Pump run time is displayed to monitor accumulated run time of the associated pump. Pump hours roll over at 999,999.9. Enter code “P-2-1” to reset the hour meter for Influent Tank Pump
- Pump will be indicated as “RUNNING” or “STOPPED”
- Press the “ENTER MAX FLOW RATE” to enter the maximum flow rate of the treatment system. This number will be used to calculate the flow setpoint of the CF valve by subtracting the ODC Wells flow rate and the WCC Wells flow rate from this setpoint. If the effluent flow rate (FIT 5-1) falls below the maximum flow rate setpoint, the effluent flow rate will be used to determine the flow setpoint of the CF Valve.

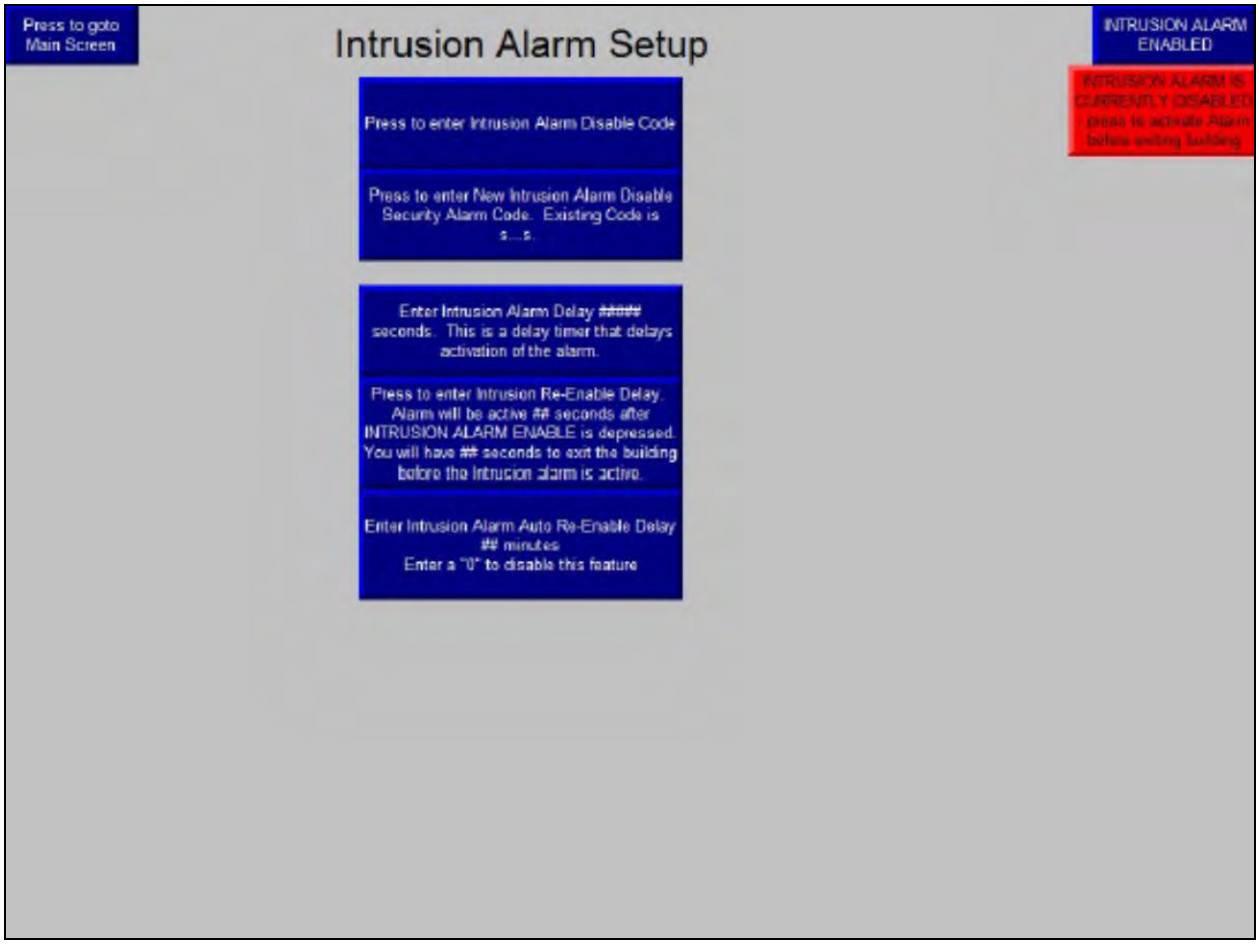
- Press the “MAIN SCREEN” button to goto the main screen.
- Press the “ALARM RESET” button to attempt to reset any active alarm.
- Press the “FROM WCC WELLS” to goto that screen.
- Press the “FROM ODC WELLS” to goto that screen.
- Press the “FROM CF SUMP” to goto that screen.
- Press the “INTRUSION ALARM DISABLE” to enter code to disable the intrusion alarm.
- Press the “INTRUSION ALARM IS CURRENTLY DISABLED” to start the timer to activate the intusion alarm. You will have “X” amount of time to exist the building before the alarm becomes active.
- “INTRUSION ALARM ENABLED” will be diplayed when the alarm is enabled.
- “INTRUSION ALARM EXIST” will be displayed when the intrustion alarm is active.



- FIT 1-1, 1-2, 1-3-1, 1-3-2, AND 5-1 totals for daily, weekly, monthly, and yearly are displayed
- FIT 1-1, 1-2, 1-3-1, 1-3-2, and 5-1 daily minimum and maximum flows are indicated
- LIT 2-1, 1-2, 1-3-1, 1-3-2, 1-3-3, 1-3-4, 1-3-5, and 1-3-6 daily minimum and maximum levels are indicated
- PDIT 3-1, 4-1, and 4-2 daily minimum and maximum pressures are indicated
- Press the “MAIN SCREEN” button to goto the main screen.
- Press the “ALARM RESET” button to attempt to reset any active alarm.
- Press the “INTRUSION ALARM DISABLE” to enter code to disable the intrusion alarm.
- Press the “INTRUSION ALARM IS CURRENTLY DISABLED” to start the timer to activate the intusion alarm. You will have “X” amount of time to exist the building before the alarm becomes active.
- “INTRUSION ALARM ENABLED” will be diplayed when the alarm is enabled.
- “INTRUSION ALARM EXIST” will be displayed when the intrustion alarm is active.

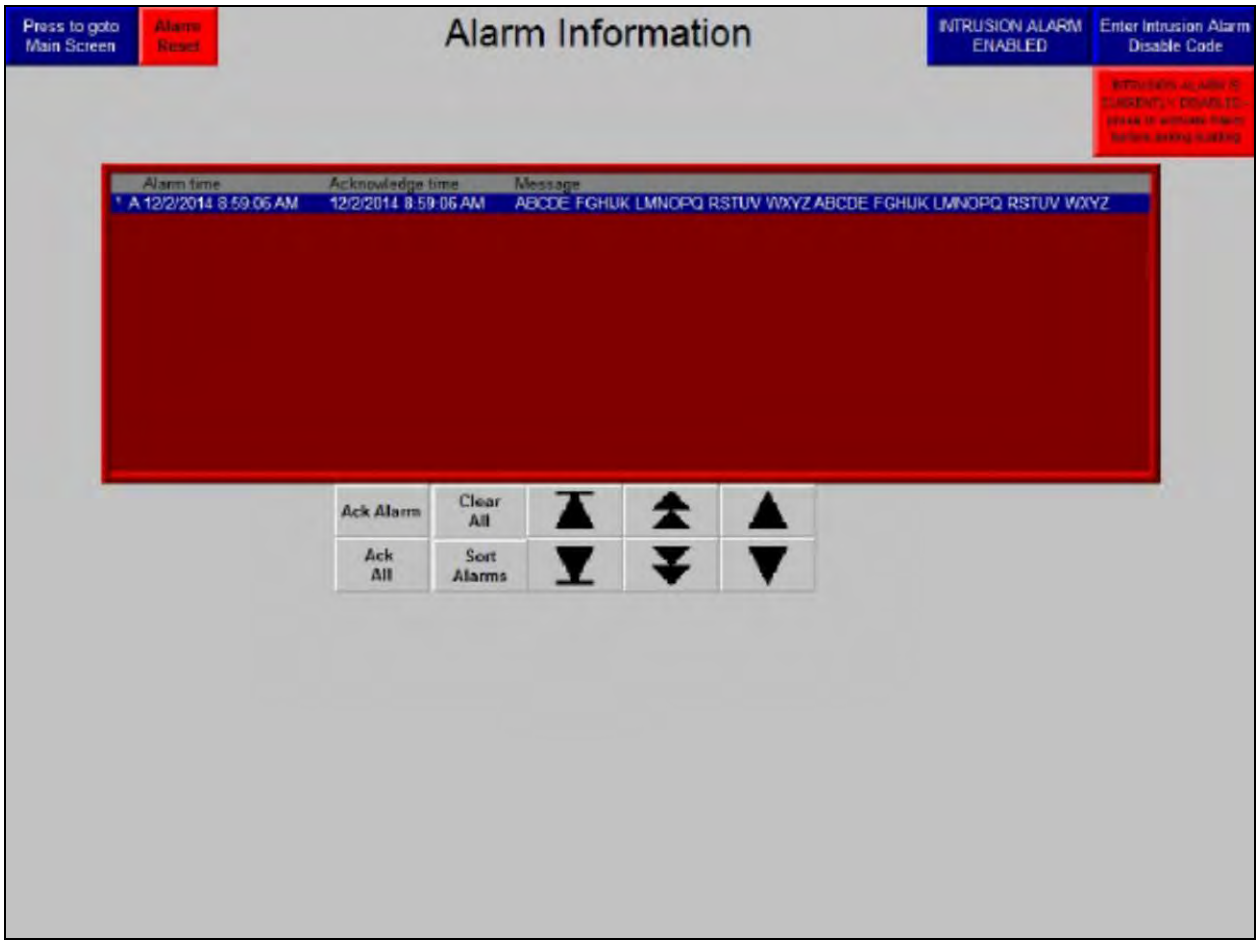


- Press the appropriate button to enter the alarm setpoint for the associated flow, level, or pressure transmitter
- To disable an alarm, enter the max value shown on the pop up entry.
- If a particular transmitter is “out of service”, press the OUT/IN button to disable alarms from that transmitter.
- LIT 2-1 setpoints should not exceed 26”.
- Press the “MAIN SCREEN” button to goto the main screen.
- Press the “ALARM RESET” button to attempt to reset any active alarm.
- Press the “INTRUSION ALARM DISABLE” to enter code to disable the intrusion alarm.
- Press the “INTRUSION ALARM IS CURRENTLY DISABLED” to start the timer to activate the intusion alarm. You will have “X” amount of time to exist the building before the alarm becomes active.
- “INTRUSION ALARM ENABLED” will be diplayed when the alarm is enabled.
- “INTRUSION ALARM EXIST” will be displayed when the intrustion alarm is active.



- Press the “MAIN SCREEN” button to goto the main screen.
- Press the “INTRUSION ALARM DISABLE” to enter code to disable the intrusion alarm.
- Press the “NEW INTRUSION ALARM DISABLE CODE” to change the disable code needed to disable the intrusion alarm
- Press the “INTRUSION ALARM IS CURRENTLY DISABLED” to start the timer to activate the intusion alarm. You will have “X” amount of time to exist the building before the alarm becomes active.
- “INTRUSION ALARM ENABLED” will be diplayed when the alarm is enabled.
- “INTRUSION ALARM EXIST” will be displayed when the intrustion alarm is active.
- Press the “INTRUSION RE-ENABLE DELAY” button to enter the amount of time (in seconds) that an operator has to exit the building prior to the alarm becoming active.
- Press the “ALARM AUTO RE-ENABLE DELAY” button to enter the amount of time (in minutes) that the intrusion alarm will wait before it is automatically re-enabled. Entering “0” in the field will disable this option.

- Used to view current alarms, time that alarm occurred, time it was acknowledged, and if it is active.
- This screen will pop up when a new alarm is actived



- Used to view current alarms, time that alarm occurred, time it was acknowledged, and if it is active
- This sreen is used to view alarms if a new alarm has not occurred.

4. System Network Information

- PLC IP address: 192.168.2.200
- HMI IP address: 192.168.2.201
- Webport IP address: 192.168.2.202

5. VFD Parameter settings

To view default VFD settings, fault codes, or other VFD information, refer to EATON 9000X AF Drives User Manual.
All VFD parameters are set from manufacturer default except the following:

- P.1.1.8 Set for 3450
- P.1.1.9 Set for 3.2

6. Webport communication Information, instructions for downloading data, and configuration information

To access Spectrum Webport O&M and instuction information, please log into the Spectrum Webport website at http://spectrumcontrols.blob.core.windows.net/help/index.htm then search for information to access operational parameters, datalog information, alarm notification, configuration of contacts, etc.

To access the Spectrum Webport for remote access to the PLC and HMI, visit http://spectrumcontrols.cloudapp.net/ and then

Enter the user name: rcarlson@h2ktech.com
Enter the password: vI7W58Qe

Then click the "webports" tab at the top of the screen and click the connect button to send an SMS message to the webport to "wake" it up. Once that occurs, you may go online with the PLC and HMI and make programming changes. If you need addition Spectrum Webport support, please contact Spectrum at 425-746-9481 or email questions to applicationsupport@spectrumcontrols.com.

7. Intrusion Alarm system description

- Each screen indicates if the INTRUSION ALARM ENABLED.
- If INTRUSION ALARM IS CURRENTLY DISABLED" is displayed, the INTRUSION ALARM is deactivated. Press this button to activate the alarm. You will have a user selectable number of seconds (see Intrusion Alarm Setup Screen description) to leave the building before the alarm will become active.
- If the intrusion alarm is active, upon entering the building you will have a user selectable number seconds (see Intrusion Alarm Setup Screen description) to enter the disable code (default is "zxc") before the alarm will activate.
- Once deactivated, you may press the "CODE TO SETUP INTRUSION ALARM SETUP" access button on the Main Screen. Entering the code "abcd" will allow "INTRUSION ALARM SETUP SCREEN" button to become visable. Once that button is visable, you may press it to enter the Intrusion Alarm Setup screen. See the Intrusion Alarm Setup description for explaination of operator parameters that may be entered or changed on that screen.

Section 4. Installation, Start–up & Shut-down Procedures

Contains general installation instructions, start up and shut down procedures.

Before starting any system, thoroughly inspect the system for signs of damage. Use the P&ID to verify that the system has been connected correctly. Then, read the start up procedure before proceeding.

Start-Up Procedure:

- Verify the system is properly secure.
- Verify that all influent and effluent connection have been made, and open all valves to ensure that there are no restrictions on the blower.
- Turn on power to the control panel. If any lights come on press the reset button and the alarms should clear. If not, check the switches and controls to determine the problem.
- For initial startup, verify the power leads are properly wired to the motor. If the operator is not comfortable with this inspection, an electrician should perform the work. **Incorrect voltage or improper wiring will ruin the motor. Motor circuit protection is install (overloads, breakers, VFD's), that may trip if incorrect voltage is supplied, or if the motor is wired incorrectly.**

Control Panel 1ϕ, 240V

WARNING! – Do not power the panel until this procedure is complete. Damage to the panel may result.

- Switch the disconnect to the "OFF" position and open the inner door. Verify that the inner door disconnect is in the off position.
- Switch on the main incoming power to the panel. CAUTION! - The disconnect now has power!
- Confirm that incoming power is 240 V. If the incoming power has a "high leg" (a four wire delta system), measure the voltage from each leg to ground. It is critical that L1and L2 to ground be 120 volts. Power for the control panel is taken from either L1 or L2.
- It is best to record the initial readings of the system for trouble shooting purposes later. Record the following operating conditions:

  L1 to ground _____ V
  L2 to ground _____ V
  L1 to L2 _____ V
- Be sure that all circuit protectors are reset.
- Close the inner door. Make sure that all of the green OOR's (On-Off-Remote) are in the "OFF" position. Turn the main breaker to the "ON" position. Turn the control power breaker to the "ON" position. The panel should have power. If any alarms are present, press the "RESET" button. If the alarms will not reset, an alarm may be tripped. (See section "B" for details.)
- Rotation needs to be verified on all motors at initial startup. If the incoming power does not change, or if the motor is never disconnected, the rotation should remain

correct after initial verification. To do so, bump any motor holding the HOA in the "HAND" position for no more than a second. Rotation arrows are located most pieces of equipment. If the operator is not comfortable completing this task, an electrician should perform the task.

- If rotation is backwards, have an electrician change rotation per the wiring diagram on the motor. **Be sure to lock out and tag the main incoming power. Verify that there is no power with a multimeter.**

Cartridge Filters

- Select and install the correct size micron filter cartridge. Make sure the filter cartridge is "seated" to the top & bottom of the filter housing and tightly close it.
- Note: We normally recommend a 25 micron or less filter to protect carbon adsorbers.
- Make sure all water connections are made and valves are open or closed as necessary.
- Open vent plug on lid to allow air to escape from housing.
- When housing body is full of water, liquid will escape from the vent. Close the vent.
- Open the outlet connection and fully open the inlet connection. Housing is now operating properly.

Removal of Spent Filter Cartridge:

- When the differential pressure (this is the difference between the inlet and outlet pressure gauges) across the housing reaches approximately 10 psi, the filter cartridge(s), need to be changed. The alarm setpoint is adjustable in the operator interface. A setting between 10-12 psid is recommended. A higher pressure will lower the water flow rate of the system.

Note: It may take days or weeks for the differential pressure to reach 10 psi, but the differential pressure will rise very quickly when it approaches 10 psi. You may also need to change the filter before 10 psi because of reduced water flow rates.

- Turn off the water source to the filter.
- Close the inlet and outlet valves.
- Relieve pressure inside the housing by slowing opening the air bleed valve, or the drain valve.
- Drain the housing into the floor sump using the drain valve and tubing.
- Loosen the housing lid with a wrench.
- Discard the filter in accordance with all local and federal laws.
- Debris and sludge should be removed from the housing, to prolong filter efficiency.
- Install new filter in housing and follow the start up procedure.

Centrifigal Pump

- Ensure that all valves up stream on the pump are open. Valves up stream should never be used to throttle the pump. All valves located up stream of a pump are strictly isolation valves for servicing the pump. Close all sample taps.
- For initial startup, verify the power leads are properly wired to the motor. If the operator is not comfortable with this inspection, an electrician should perform the work. **Incorrect voltage or improper wiring will ruin the motor. Motor circuit**

protection is install (overloads, breakers, VFD's), that may trip if incorrect voltage is supplied, or if the motor is wired incorrectly.

- **Check alignment of the pump and motor coupling.**
- **Install gear oil into the pump housing per the manufacturer's recommendations.**
- Bump the pump to verify rotation by holding the PUMP HOA in the "HAND" position for no more than a few seconds. Rotation arrows are located on the pump to signify proper rotation.
- If rotation is backwards, have an electrician change the wiring per the motor diagram for rotation change.. **Be sure to lock out and tag the main incoming power. Verify that there is not power at the motor with a multimeter.**
- Prime the pump for initial startup. Once the pump is primed and not run dry, it should stay primed.
- If there is a suction head requirement on the pump inlet due to elevation, the pump may be primed by open the top plug and adding water until full.
- If there is a suction head requirement due to a mechanical vacuum, the pump may be primed by turning off the source of the vacuum. Water should gravity feed into the pump.
- If there is a positive suction head, the pump should self-prime.
- Test the prime. Run the pump for a few seconds to verify that water is flowing through the pump at a constant rate and pressure. If not, repeat the above steps.
- Put the Pump HOA in the "AUTO" position. Throttle the pump to the desired flow.
- It is best to record the initial readings of the system for trouble shooting purposes later. Record the following operating conditions:

  PUMP motor amp draw _____
  PUMP pressure _____
  PUMP flow rate _____

Notes: Depending on the interlock schedule, the pump may not run until all of the appropriate alarms have been cleared and the correct pieces of equipment enabled.

LC - Liquid Phase Carbon

Please review the below for recommend operating flow rates. The correct flow rate for your system will be determined by the contaminate levels you are treating. Make sure that all valves are open or closed as required and all connections are properly made to the vessels. Note water flow is in at the top, out the bottom. The maximum recommended flow rate through the PV1000 carbon vessel is 50 gpm.

- It is recommend that cartridge filters be used to protect the carbon bed from being fouled if there is sediment in the water to be treated. We recommend a 25 micron or smaller filter cartridge.

Backwashing:

- For optimum performance the carbon should be backwashed, to remove carbon fines and allow for better water distribution. It is VERY IMPORTANT that the backwash be done properly or the vessel can be damage and/or the carbon bed can be ruined. If backwashing is not possible, flooding the vessel from the bottom up with clean water, 24 hours before the vessels are to be used is recommended.

- The backwash water source needs to be sediment-free and contaminate free water.
- The backwash rate for the PV1000 carbon vessel is 40-50 gpm. Ideally, the carbon bed should be flooded and allowed to sit for 24 hr. with clean water before the backwash is started. The backwash should be performed at the flow rate listed for 15-20 minutes per vessel. Start out with a slow flow (approx. 10 gpm) at the beginning of the backwash. Slowly increasing the flow until the required backwash is met. Observe the backwash discharge to make sure carbon is not coming out of the vessel. If it is, slow down the flow and slowly increase again until the required backwash flow is met.
- Only one vessel can be done at a time, isolated from the rest of the system, with the discharge backwash water going to a holding tank.
- Backwash flow rate should be started low and brought up to the recommended flow rate. If the backwash flow rate is started too high the carbon bed will rise and be flushed out the backwash discharge line. Monitor the backwash discharge, if carbon is present, back off on the flow rate.
- The differential pressure across the carbon bed needs to be monitored closely. It should never be allowed to exceed 20 psi, as this will cause damage to the internal piping assembly in the carbon vessel.
- The backwash should be done until the backwash discharge water is clear, this takes approx. 20 min. at the recommend flow rate.

- The initial start-up pressure drop through a clean vessel should be approximately 1-5 psi, depending on the flow rate.
- During operation, the differential pressure through the vessel should not be allowed to exceed 15 psi. If this happens the vessel should be taken off-line, the top of the carbon bed inspected for fouling and backwashed.
- Note: If the top of the carbon bed is encrusted, the encrusted layer will have to be removed manually before a backwash is started.
- Water samples taken between the vessels will determine when the carbon needs to be changed out
- The newly replaced carbon vessel should be installed in the lag position and the lag vessel be moved into the lead position.

Diffused Aeration Tank (DTA)

To operate the DTA:

- Open the valve from the influent header to the DTA. Close the valve from the influent header to the influent tank
- Close all drain valves at the base of the DTA tank.

To bypass the DTA:

- Reverse the valves from the influent header so that the water bypasses the DTA and flows directly to the influent tank.
- Turn the breaker for the DTA blower in the breaker panel to the off position
- Turn the DTA switch on the control panel to the “REMOTE” position.
- NOTE THAT THE SYSTEM WILL NOT OPERATE UNLESS THE DTA SWITCH ON THE CONTORL PANEL IS IN THE “REMOTE” POSITION.

Metering Pump

To operate the Metering Pump:

- On the control panel “Treatment Building Equipment Screen”, touch the metering pump icon and set the amount of product to be injected into the influent to the desired volume, denoted as a percentage (%). Adjust the percentage up or down as necessary to vary the volume of WaterTech 5390 (tetrapotassium pyrophosphate) injected into the influent water to eliminate the iron from precipitating from the influent.
- Note that the volume of product injected into the influent is automatically adjusted based on the volume of flow through the influent header system. Thus, adding/eliminating pumps or increasing/decreasing the pumping rate of the pumps will automatically increase/decrease the injection rate of the metering pump.

SHUT DOWN PROCEDURES:

CAUTION! – When disabling any motor or piece of equipment be certain that all source of power and fluid have been locked out and tagged.

Influent water to the system (wells and sump)

Turn HOA switches to off.

Influent pump

Allow pump to turn off via the pump down in the tank.
Turn the HOA switch to off.

Cartridge Filters

Turn influent tank pump HOA switches to off.
For short term shutdown, no other action required.
For long term shutdown, drain and remove filters to prevent bio growth.

LC - Liquid Phase Carbon Units

Be sure all sources of water to the units are disabled.
For short term shutdown, water and carbon can remain in the vessels
For long term shutdown, drain all water from the vessels. Pressurized air in the inlet may be needed to remove the water completely. Carbon can be removed if there is a chance of bio growth developing.

Diffused Aeration Tank

Turn DTA tank blower HOA switches to off.
Close the influent valve from the influent header to the DTA tank.
For short term shutdown, water can remain in the DTA tank.
For long term shutdown, drain all water from the DTA tank by opening the ¾-inch valves at the base of the tank.

Section 5. Maintenance Schedule

These forms should be used as a guide for general maintenance items. The recommended maintenance intervals are based upon past experience with the equipment and equipment manufactures' literature. It is important to use discretion when implementing the maintenance schedule. Unforeseen operating condition may require additional maintenance.

Recommend frequency	Task	Comment

LC - Liquid Phase Carbon Units

As Needed	Backwash	When differential pressure across the vessel exceeds 15psi.
	Exchange Carbon	When Carbon becomes spent or cannot be effectively backwashed or the carbon is spent.

Centrifugal Pump

First 200 hours	Replace gear oil	
First 2000 hours	Replace gear oil	
Yearly	Grease motor with NLGI #2, if applicable. Replace gear oil	May require service more often based on the site operating conditions

Cartridge Filter

As Needed	Filter change out	When differential pressure across the vessel exceeds 10-12 psi. 1. Shut off water flow to the filter. 2. Isolate the inlet and outlet of the filter. 3. Slowly open the air bleed valve to release the pressure. 4. Open the housing with the wrench provided and pull out the dirty filter. 6. Put in new filters and make sure they are seated properly. 7. Reinstall and tighten housing. 8. Close drain. 9. Open isolation valves. 10. Begin water flow. 11. Bleed air out of the filter and close bleed air valve.

Section 6. Trouble Shooting Guide:

Any time the system will not run and there is not an alarm condition present, verify the following:

1. All alarm lights are functioning.
2. All circuit protectors are reset. Open the inner door and reset any circuit protectors that may have been tripped. A tripped circuit protector may indicate a problem with the system. Inspect the system for abnormal conditions.
3. All of the inter locks have been properly installed.
    - If the provided panel requires an upstream or a downstream enable, verify that the enable is present and wired correctly.

For all other troubleshooting refer to the following table:

System Problem	Possible cause	Solution
LC - Liquid Phase Carbon		
High differential pressure	Fines were not backwashed out at startup	Backwash vessel
	Solids or organics fouling top of bed	Backwash vessel
	Air pocket	Bleed air from top of vessel
High differential pressure even after backwash	Solids or organics fouling top of bed	Remove the top layer or affected area of the carbon bed
Carbon in the effluent	Lateral broken	Empty carbon bed and replace damaged lateral.
Cartridge Filters		
High differential pressure	Bag fouled	Replace filter element
	Solids or organics fouling top of bed	Replace filter element
	Air pocket	Bleed air from top of vessel
Solids in the effluent	Filter element torn or damaged	Replace filter element
	Too large of micron filter element	Use smaller micron filter element
Transfer Pump		
See Pump O&M manual for details.		

Appendix C-2
Controls Equipment

Enviroline® Series Single-Door Enclosures

Application -

Designed to house electrical and electronic controls, instruments and components. Provides protection from dust, oil and water. For outdoor application a drip shield is recommended. For installation information, consult our Installation Manual at www.saginawcontrol.com.

Construction -

- 0.075" carbon steel.
- Seams continuously welded and ground smooth.
- Flange trough collar around all sides of door opening.
- Oil-resisitant gasket.
- Collar studs provided for mounting optional panels.
- Concealed hinge.
- Removable and interchangeable doors.
- Black quarter turn latches.
- Latches are opened or closed with a screwdriver.
- Mounting holes in back of enclosure.
- Mounting hardware, sealing washer and hole plug included.
- Removable print pocket.
- Ground studs on door and body.

Options -

- Optional tamper-resistant inserts are available.
- Optional mounting feet available.
- Door hardware available.

Finish -

ANSI-61 gray powder coating inside and out. Optional panels are powder coated white.

IS2 - Industry Standards -
NEMA Type 4, 12 & Type 13
UL Listed Type 4 & 12
CSA Type 4 & 12
IEC 60529 IP66

Notes -

Interchangeable latches and handles available in the accessory section.

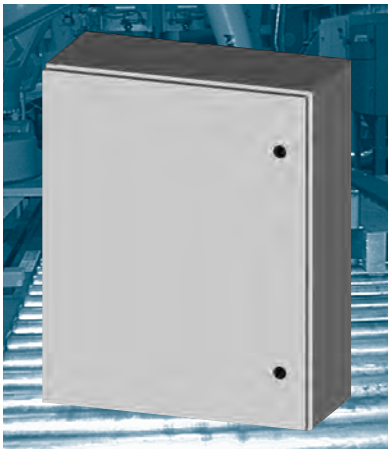
ENVIROLINE® SERIES SINGLE-DOOR ENCLOSURES

ENCLOSURE PRODUCT CODE E3						SUB-PANEL (P3)			
Catalog No.	Height (A)	Width (B)	Depth (C)	Industry Standard	List Price	Catalog No.	Panel Height (D)	Panel Width (E)	List Price
SCE-12EL1206LP	12.00	12.00	6.00	IS2	183.29	SCE-12DLP12	9.00	9.00	13.67
SCE-12EL2406LP	12.00	24.00	6.00	IS2	218.97	SCE-12P24	9.00	21.00	27.86
SCE-16EL1206LP	16.00	12.00	6.00	IS2	194.36	SCE-16P12	13.00	9.00	14.81
SCE-16EL1208LP	16.00	12.00	8.00	IS2	205.44	SCE-16P12	13.00	9.00	14.81
SCE-16EL1408LP	16.00	14.00	8.00	IS2	211.59	SCE-16DLP14	13.00	11.00	17.72
SCE-16EL1606LP	16.00	16.00	6.00	IS2	210.37	SCE-16P16	13.00	13.00	24.57
SCE-16EL1608LP	16.00	16.00	8.00	IS2	234.97	SCE-16P16	13.00	13.00	24.57
SCE-16EL2006LP	16.00	20.00	6.00	IS2	236.19	SCE-20P16	17.00	13.00	30.37
SCE-16EL2008LP	16.00	20.00	8.00	IS2	237.42	SCE-20P16	17.00	13.00	30.37
SCE-20EL1206LP	20.00	12.00	6.00	IS2	209.13	SCE-20P12	17.00	9.00	23.14
SCE-20EL1606LP	20.00	16.00	6.00	IS2	225.12	SCE-20P16	17.00	13.00	30.37
SCE-20EL1608LP	20.00	16.00	8.00	IS2	237.42	SCE-20P16	17.00	13.00	30.37
SCE-20EL1612LP	20.00	16.00	12.00	IS2	263.25	SCE-20P16	17.00	13.00	30.37
SCE-20EL2006LP	20.00	20.00	6.00	IS2	242.34	SCE-20P20	17.00	17.00	35.44
SCE-20EL2008LP	20.00	20.00	8.00	IS2	255.87	SCE-20P20	17.00	17.00	35.44
SCE-20EL2012LP	20.00	20.00	12.00	IS2	284.17	SCE-20P20	17.00	17.00	35.44
SCE-20EL2408LP	20.00	24.00	8.00	IS2	275.56	SCE-24P20	21.00	17.00	45.57
SCE-24EL1206LP	24.00	12.00	6.00	IS2	218.97	SCE-12P24	9.00	21.00	27.86
SCE-24EL1606LP	24.00	16.00	6.00	IS2	239.89	SCE-24P16	21.00	13.00	32.92
SCE-24EL1608LP	24.00	16.00	8.00	IS2	253.42	SCE-24P16	21.00	13.00	32.92
SCE-24EL2006LP	24.00	20.00	6.00	IS2	260.80	SCE-24P20	21.00	17.00	45.57
SCE-24EL2008LP	24.00	20.00	8.00	IS2	275.56	SCE-24P20	21.00	17.00	45.57
SCE-24EL2010LP	24.00	20.00	10.00	IS2	292.78	SCE-24P20	21.00	17.00	45.57
SCE-24EL2012LP	24.00	20.00	12.00	IS2	307.54	SCE-24P20	21.00	17.00	45.57
SCE-24EL2016LP	24.00	20.00	16.00	IS2	337.06	SCE-24P20	21.00	17.00	45.57
SCE-24EL2406LP	24.00	24.00	6.00	IS2	281.71	SCE-24P24	21.00	21.00	53.18
SCE-24EL2408LP	24.00	24.00	8.00	IS2	297.70	SCE-24P24	21.00	21.00	53.18
SCE-24EL2410LP	24.00	24.00	10.00	IS2	314.93	SCE-24P24	21.00	21.00	53.18
SCE-24EL2412LP	24.00	24.00	12.00	IS2	329.69	SCE-24P24	21.00	21.00	53.18
SCE-24EL2416LP	24.00	24.00	16.00	IS2	362.90	SCE-24P24	21.00	21.00	53.18
SCE-24EL3008LP	24.00	30.00	8.00	IS2	329.69	SCE-30P24	27.00	21.00	63.29
SCE-24EL3010LP	24.00	30.00	10.00	IS2	355.51	SCE-30P24	27.00	21.00	63.29
SCE-30EL1606LP	30.00	16.00	6.00	IS2	263.25	SCE-30P16	27.00	13.00	45.57
SCE-30EL2008LP	30.00	20.00	8.00	IS2	303.85	SCE-30P20	27.00	17.00	55.70
SCE-30EL2010LP	30.00	20.00	10.00	IS2	319.84	SCE-30P20	27.00	17.00	55.70
SCE-30EL2408LP	30.00	24.00	8.00	IS2	329.69	SCE-30P24	27.00	21.00	63.29
SCE-30EL2410LP	30.00	24.00	10.00	IS2	355.51	SCE-30P24	27.00	21.00	63.29
SCE-30EL2412LP	30.00	24.00	12.00	IS2	366.59	SCE-30P24	27.00	21.00	63.29
SCE-30EL2416LP	30.00	24.00	16.00	IS2	404.72	SCE-30P24	27.00	21.00	63.29
SCE-30EL2420LP	30.00	24.00	20.00	IS2	441.62	SCE-30P24	27.00	21.00	63.29
SCE-30EL2424LP	30.00	24.00	24.00	IS2	478.53	SCE-30P24	27.00	21.00	63.29
SCE-30EL3008LP	30.00	30.00	8.00	IS2	369.05	SCE-30P30	27.00	27.00	83.55
SCE-30EL3010LP	30.00	30.00	10.00	IS2	410.87	SCE-30P30	27.00	27.00	83.55
SCE-30EL3012LP	30.00	30.00	12.00	IS2	423.17	SCE-30P30	27.00	27.00	83.55
SCE-30EL3608LP	30.00	36.00	8.00	IS2	408.42	SCE-36P30	33.00	27.00	101.27
SCE-36EL2408LP	36.00	24.00	8.00	IS2	362.90	SCE-36P24	33.00	21.00	75.96
SCE-36EL2410LP	36.00	24.00	10.00	IS2	392.42	SCE-36P24	33.00	21.00	75.96
SCE-36EL2412LP	36.00	24.00	12.00	IS2	404.72	SCE-36P24	33.00	21.00	75.96
SCE-36EL2416LP	36.00	24.00	16.00	IS2	418.25	SCE-36P24	33.00	21.00	75.96

Phone (989) 799-6871
Fax (989) 799-4524
SCE SAGINAW CONTROL & ENGINEERING
Your Enclosure Source®

ENVIROLINE® SERIES SINGLE-DOOR ENCLOSURES

ENCLOSURE PRODUCT CODE E3						SUB-PANEL (P3)			
Catalog No.	Height (A)	Width (B)	Depth (C)	Industry Standard	List Price	Catalog No.	Panel Height (D)	Panel Width (E)	List Price
SCE-36EL3008LP	36.00	30.00	8.00	IS2	408.42	SCE-36P30	33.00	27.00	101.27
SCE-36EL3010LP	36.00	30.00	10.00	IS2	435.47	SCE-36P30	33.00	27.00	101.27
SCE-36EL3012LP	36.00	30.00	12.00	IS2	452.70	SCE-36P30	33.00	27.00	101.27
SCE-36EL3016LP	36.00	30.00	16.00	IS2	498.22	SCE-36P30	33.00	27.00	101.27
SCE-36EL3020LP	36.00	30.00	20.00	IS2	542.51	SCE-36P30	33.00	27.00	101.27
SCE-36EL3608LP	36.00	36.00	8.00	IS2	452.70	SCE-36P36	33.00	33.00	118.99
SCE-36EL3612LP	36.00	36.00	12.00	IS2	501.91	SCE-36P36	33.00	33.00	118.99
SCE-36EL3616LP	36.00	36.00	16.00	IS2	551.11	SCE-36P36	33.00	33.00	118.99
SCE-40EL2412LP	40.00	24.00	12.00	IS2	428.10	SCE-40P24	37.00	21.00	86.08
SCE-42EL2410LP	42.00	24.00	10.00	IS2	457.63	SCE-42P24	39.00	21.00	91.14
SCE-42EL3008LP	42.00	30.00	8.00	IS2	449.01	SCE-42P30	39.00	27.00	116.47
SCE-42EL3010LP	42.00	30.00	10.00	IS2	471.15	SCE-42P30	39.00	27.00	116.47
SCE-42EL3012LP	42.00	30.00	12.00	IS2	496.98	SCE-42P30	39.00	27.00	116.47
SCE-42EL3016LP	42.00	30.00	16.00	IS2	528.98	SCE-42P30	39.00	27.00	116.47
SCE-42EL3608LP	42.00	36.00	8.00	IS2	499.46	SCE-42P36	39.00	33.00	136.72
SCE-42EL3610LP	42.00	36.00	10.00	IS2	524.06	SCE-42P36	39.00	33.00	136.72
SCE-42EL3612LP	42.00	36.00	12.00	IS2	551.11	SCE-42P36	39.00	33.00	136.72
SCE-42EL3616LP	42.00	36.00	16.00	IS2	605.24	SCE-42P36	39.00	33.00	136.72
SCE-48EL2408LP	48.00	24.00	8.00	IS2	429.32	SCE-48P24	45.00	21.00	98.74
SCE-48EL2412LP	48.00	24.00	12.00	IS2	477.30	SCE-48P24	45.00	21.00	98.74
SCE-48EL3010LP	48.00	30.00	10.00	IS2	512.98	SCE-48P30	45.00	27.00	129.13
SCE-48EL3016LP	48.00	30.00	16.00	IS2	574.49	SCE-48P30	45.00	27.00	129.13
SCE-48EL3608LP	48.00	36.00	8.00	IS2	542.51	SCE-48P36	45.00	33.00	154.46
SCE-48EL3610LP	48.00	36.00	10.00	IS2	573.27	SCE-48P36	45.00	33.00	154.46
SCE-48EL3612LP	48.00	36.00	12.00	IS2	600.33	SCE-48P36	45.00	33.00	154.46
SCE-48EL3616LP	48.00	36.00	16.00	IS2	658.14	SCE-48P36	45.00	33.00	154.46
SCE-48EL3620LP	48.00	36.00	20.00	IS2	715.97	SCE-48P36	45.00	33.00	154.46
SCE-60EL2412LP	60.00	24.00	12.00	IS2	551.11	SCE-60P24	57.00	21.00	129.13
SCE-60EL3610LP	60.00	36.00	10.00	IS2	667.98	SCE-60P36	57.00	33.00	189.89
SCE-60EL3612LP	60.00	36.00	12.00	IS2	698.74	SCE-60P36	57.00	33.00	189.89
SCE-60EL3616LP	60.00	36.00	16.00	IS2	765.17	SCE-60P36	57.00	33.00	189.89
SCE-60EL3620LP	60.00	36.00	20.00	IS2	832.83	SCE-60P36	57.00	33.00	189.89
SCE-60EL3624LP	60.00	36.00	24.00	IS2	1127.62	SCE-60P36	57.00	33.00	189.89
SCE-72EL3012LP	72.00	30.00	12.00	IS2	749.18	SCE-72P30	69.00	27.00	210.15
SCE-72EL3016LP	72.00	30.00	16.00	IS2	856.21	SCE-72P30	69.00	27.00	210.15
SCE-72EL3024LP	72.00	30.00	24.00	IS2	941.08	SCE-72P30	69.00	27.00	210.15
SCE-72EL3612LP	72.00	36.00	12.00	IS2	799.62	SCE-72P36	69.00	33.00	225.33
SCE-72EL3616LP	72.00	36.00	16.00	IS2	910.33	SCE-72P36	69.00	33.00	225.33



SCE SAGINAW CONTROL & ENGINEERING
Your Enclosure Source®
Phone (989) 799-6871
Fax (989) 799-4524

Enviroline® Series Single-Door Enclosures

Application -
Designed to house electrical and electronic controls, instruments and components. Provides protection from dust, oil and water. For outdoor application a drip shield is recommended. For installation information, consult our Installation Manual at www.saginawcontrol.com.

Construction -
- 0.075" carbon steel.
- Seams continuously welded and ground smooth.
- Flange trough collar around all sides of door opening.
- Oil- resisitant gasket.
- Collar studs provided for mounting optional panels.
- Concealed hinge.
- Removable and interchangeable doors.
- Black quarter turn latches.
- Latches are opened or closed with a screwdriver.
- Mounting holes in back of enclosure.
- Mounting hardware, sealing washer and hole plug included.
- Removable print pocket.
- Ground studs on door and body.

Options -
- Optional tamper-resistant inserts are available.
- Optional mounting feet available.
- Door hardware available.

Finish -
ANSI-61 gray powder coating inside and out. Optional panels are powder coated white.

IS2 - Industry Standards -
NEMA Type 4, 12 & Type 13
UL Listed Type 4 & 12
CSA Type 4 & 12
IEC 60529 IP66

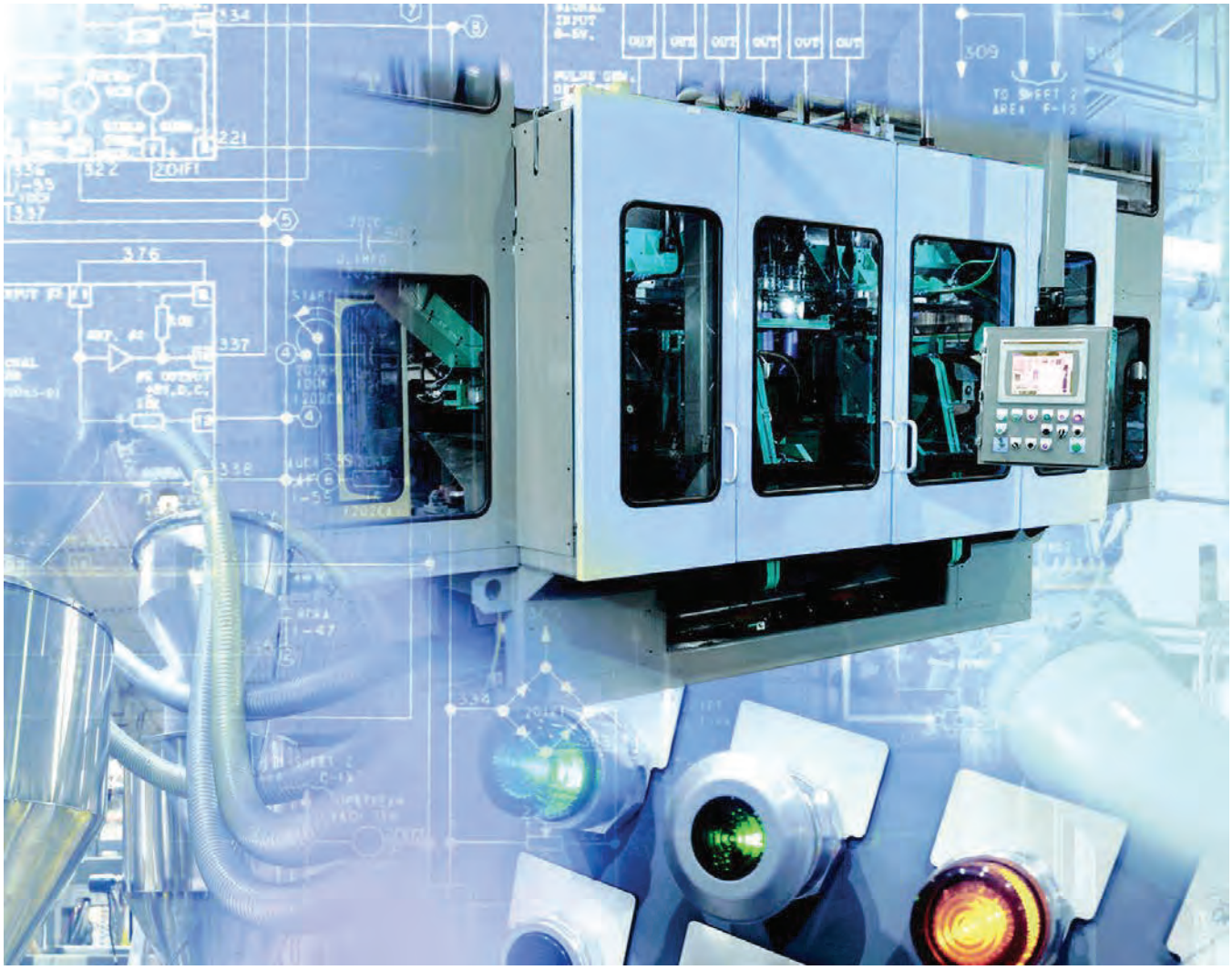
Notes -
Interchangeable latches and handles available in the accessory section.

Selection Guide

Allen-Bradley

ControlLogix System

Catalog Numbers 1756 series



LISTEN. THINK. SOLVE.®

Allen-Bradley • Rockwell Software

Rockwell Automation

Logix Controllers Comparison

Characteristic	**1756 ControlLogix®** 1756-L71, 1756-L72, 1756-L73, 1756-L73XT, 1756-L74, 1756-L75 **1756 GuardLogix®** 1756-L71S, 1756-L72S, 1756-L73S	**1756 ControlLogix** 1756-L61, 1756-L62, 1756-L63, 1756-L63XT, 1756-L64, 1756-L65 **1756 GuardLogix** 1756-L61S, 1756-L62S, 1756-L63S	**CompactLogix™** 1769-L30ER, 1769-L30ER-NSE, 1769-L30ERM, 1769-L33ER, 1769-L33ERM, 1769-L36ERM	**CompactLogix** 1769-L24ER-BB1B, 1769-L24ER-QBFC1B, 1769-L27ERM-QBFC1B	**CompactLogix** 1769-L16ER-BB1B, 1769-L18ER-BB1B, 1769-L18ERM-BB1B
Controller tasks: • Continuous • Periodic • Event	• 32; • 100 programs/task	• 32; • 100 programs/task	• 32; • 100 programs/task	• 32; • 100 programs/task	• 32; • 100 programs/task
Event tasks	All event triggers	All event triggers	Consumed tag, EVENT instruction triggers and motion events	Consumed tag, EVENT instruction triggers and motion events	Consumed tag, EVENT instruction triggers and motion events
User memory	• 1756-L71: 2 MB • 1756-L72: 4 MB • 1756-L73: 8 MB 1756-L73XT: 8 MB • 1756-L74: 16 MB • 1756-L75: 32 MB • 1756-L71S: 2 MB + 1 MB safety • 1756-L72S: 4 MB +2 MB safety • 1756-L73S: 8 MB +4 MB safety	• 1756-L61: 2 MB • 1756-L62: 4 MB 1756-L63: 8 MB • 1756-L63XT: 8 MB 1756-L64: 16 MB • 1756-L65: 32 MB • 1756-L61S: 2 MB +1 MB safety • 1756-L62S: 4 MB +1 MB safety • 1756-L63S: 8 MB +3.75 MB safety	• 1769-L30ER, 1769-L30ER-NSE, 1769-L30ERM: 1MB • 1769-L33ER, 1769-L33ERM: 2 MB • 1769-L36ERM: 3 MB	• 1769-L24ER: 750 KB • 1769-L27ERM: 1 MB	• 1769-L16ER: 384 KB • 1769-L18ER, 1769-L18ERM: 512 KB
Memory card	Secure Digital	CompactFlash	Secure Digital	Secure Digital	Secure Digital
Built-in ports	1 port USB	1 port RS-232 serial	• Dual-port EtherNet/IP • 1 port USB	• Dual-port EtherNet/IP • 1 port USB	• Dual-port EtherNet/IP • 1 port USB
Communication options	• EtherNet/IP • ControlNet • DeviceNet • Data Highway Plus • Remote I/O • SynchLink • USB	• EtherNet/IP • ControlNet • DeviceNet • Data Highway Plus • Remote I/O • SynchLink	• EtherNet/IP – Embedded switch – Single IP address • DeviceNet • USB	• EtherNet/IP – Embedded switch – Single IP address • DeviceNet • USB	• EtherNet/IP – Embedded switch – Single IP address • USB
Controller connections	500	250 serial	256	256	256
Network connections	Per network module: • 100 ControlNet (CN2/A) • 40 ControlNet (CNB) • 256 EtherNet/IP; 128 TCP (EN2*x*) • 128 EtherNet/IP; 64 TCP (ENBT)	Per network module: • 100 ControlNet (CN2/A) • 40 ControlNet (CNB) • 256 EtherNet/IP; 128 TCP (EN2*x*) • 128 EtherNet/IP; 64 TCP (ENBT)	• 1769-L30ER, 1769-L30ER-NSE, 1769-L30ERM: 16 EtherNet/IP; 120 TCP • 1769-L33ER, 1769-L33ERM: 32 EtherNet/IP; 120 TCP • 1769-L36ERM: 48 EtherNet/IP; 120 TCP	• 1769-L24ER-QB1B: 8 EtherNet/IP; 120 TCP • 1769-24ER-BFC1B: 8 EtherNet/IP; 120 TCP • 1769-L27ERM-QBFC1B: 16 EtherNet/IP; 120 TCP	• 1769-L16ER-BB1B 4 EtherNet/IP; 120 TCP • 1769-L18ER-BB1B: 8 EtherNet/IP; 120 TCP • 1769-L18ERM-BB1B: 8 EtherNet/IP; 120 TCP
Controller redundancy	Full support	Full support	Backup via DeviceNet	Backup via DeviceNet	None
Simple motion	• Stepper • Servo via DeviceNet • Analog or networked AC drive	• Stepper • Servo via DeviceNet • Analog or networked AC drive	• Servo via DeviceNet • Analog or Networked AC drive	• Servo via DeviceNet • Analog or Networked AC drive	Analog or Networked AC drive
Integrated motion	• EtherNet/IP • SERCOS interface • Analog options: – Encoder input – LDT input – SSI input	• EtherNet/IP • SERCOS interface • Analog options: – Encoder input – LDT input – SSI input	EtherNet/IP: 1769-L30ERM, 1769-L33ERM, 1769-L36ERM	EtherNet/IP: 1769-L27-ERM-QBFC1B	EtherNet/IP: 1769-L18ERM-BB1B
Programming languages	• Relay ladder • Structured text • Function block • Sequential function chart • Safety task: relay ladder, safety application instructions	• Relay ladder • Structured text • Function block • Sequential function chart • Safety task: relay ladder, safety application instructions	• Relay ladder • Structured text • Function block • Sequential function chart	• Relay ladder • Structured text • Function block • Sequential function chart	• Relay ladder • Structured text • Function block • Sequential function chart

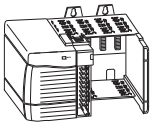
Characteristic	**1768 CompactLogix** 1768-L43, 1768-L45 **1768 Compact GuardLogix** 1768-L43S, 1768-L45S	**1769-L3*x* CompactLogix** 1769-L31, 1769-L32*x*, 1769-L35*x*	**1769-L23*x* CompactLogix** 1769-L23	**1789 SoftLogix™5800** 1789-L10, 1789-L30, 1789-L60
Controller tasks: • Continuous • Periodic • Event	• 16; • 32 programs/task	• 1769-L35*x*: 8 • 1769-L32*x*: 6 • 1769-L31: 4 • 32 programs/task	• 3; • 16 programs/task	• 32; • 100 programs/task
Event tasks	Consumed tag, EVENT instruction triggers and motion events	Consumed tag and EVENT instruction triggers	Consumed tag and EVENT instruction triggers	All event triggers, plus outbound and Windows events
User memory	• 1768-L43: 2 MB • 1768-L45: 3 MB • 1768-L43S: 2 MB +0.5 MB safety • 1768-L45S: 3 MB+1 MB safety	• 1769-L31: 512 KB • 1769-L32*x*: 750 KB • 1769-L35*x*: 1.5 MB	512 KB	• 1789-L10: 2 MB; 1 controller; no motion • 1789-L30: 64 MB; 3 controllers • 1789-L60: 64 MB; 6 controllers
Memory card	CompactFlash	CompactFlash	None	None
Built-in ports	1 RS-232	• 1769-L31: 2 RS-232 ports • 1769-L32C, 1769-L35CR: 1 ControlNet port and 1 RS-232 serial port • 1769-L32E, 1769-L35E: 1 EtherNet/IP port and 1 RS-232 serial port	• 1769-L23E-QB1B: 1 EtherNet/IP port and 1 RS-232 serial port • 1769-L23E-QBFC1B: 1 EtherNet/IP port and 1 RS-232 serial port • 1769-L23-QBFC1B: 2 RS-232 serial ports	Depends on personal computer
Communication options	• EtherNet/IP • DeviceNet • ControlNet	• EtherNet/IP • DeviceNet • ControlNet	• EtherNet/IP • DeviceNet	• EtherNet/IP • DeviceNet • ControlNet
Controller connections	250	100	100	250
Network connections	Per network module: • 48 ControlNet • 128 EtherNet/IP; 64 TCP	Per controller: • 32 ControlNet • 32 EtherNet/IP; 32 TCP	Per controller: 32 EtherNet/IP; 8 TCP	Per network module: • 48 ControlNet • 128 EtherNet/IP; 64 TCP
Controller redundancy	Backup via DeviceNet	Backup via DeviceNet	Backup via DeviceNet	N/A
Simple motion	• Stepper • Servo via DeviceNet • Analog or networked AC drive	• Stepper • Servo via DeviceNet • Analog or networked AC drive	• Stepper • Servo via DeviceNet • Analog or networked AC drive	• Stepper • Servo via DeviceNet • Analog or networked AC drive
Integrated motion	SERCOS interface	N/A	N/A	SERCOS interface Analog encoder input
Programming languages	• Relay ladder • Structured text • Function block • Sequential function chart • Safety task: relay ladder, safety application instructions	• Relay ladder • Structured text • Function block • Sequential function chart	• Relay ladder • Structured text • Function block • Sequential function chart	• Relay ladder • Structured text • Function block • Sequential function chart • External routines developed in C or C++

Notes:

Select a ControlLogix System

1756 ControlLogix System

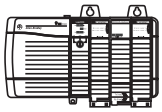
Step 1
ControlLogix I/O Modules



Page 10

Select:
- I/O modules—Some modules have field-side diagnostics, electronic fusing, or individually isolated inputs/outputs
- A remote terminal block (RTB) or wiring system for each I/O module

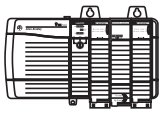
Step 2
ControlLogix Integrated Motion



Page 17

Select:
- An EtherNet/IP communication module for Integrated Motion
- A SERCOS or analog interface module
- Associated cables
- A removable terminal block (RTB)—only for analog interface modules
- Select drives, motors, and accessories (use the Motion Analyzer software)

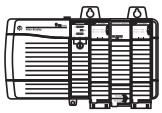
Step 3
ControlLogix Communication Modules



Page 19

Select:
- Networks
- Communication modules
- Associated cables and network equipment
- Sufficient modules and cables if you are planning a redundant system

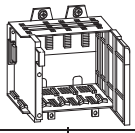
Step 4
ControlLogix Controllers



Page 27

Select:
- A controller with sufficient memory
- Memory card
- Replacement batteries, if needed

Step 5
ControlLogix Chassis



Page 32

Select:
- A chassis with sufficient slots
- Slot fillers for empty slots

Step 6
ControlLogix Power Supplies

Page 33

Select:
- One power supply for each chassis, if you are using standard power supplies
- A power supply bundle if you are planning a redundant power supply system

Optional Step
Visualization Products

Page 34

Optional Step
Programming Software

Page 35

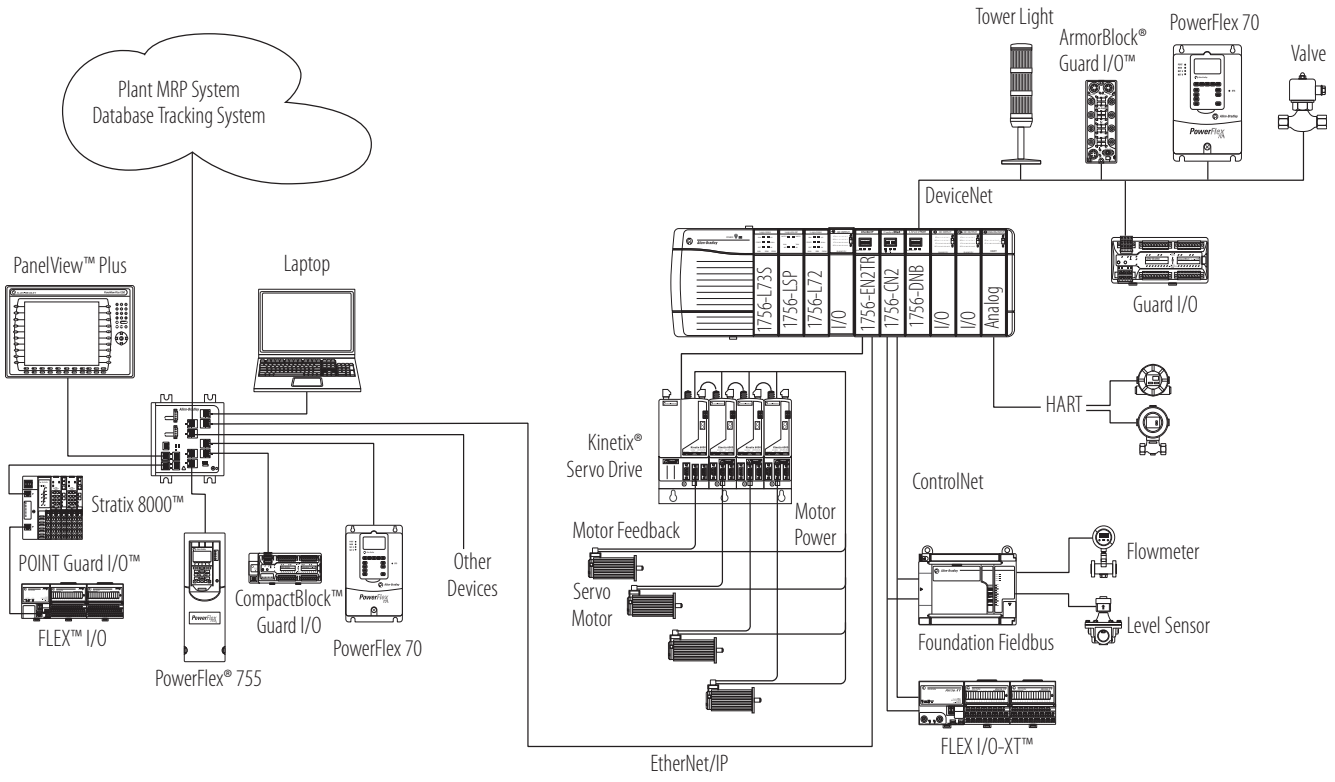
ControlLogix System Overview

The ControlLogix system provides discrete, drives, motion, process, and safety control together with communication and state-of-the-art I/O in a small, cost-competitive package. The system is modular, so you can design, build, and modify it efficiently with significant savings in training and engineering.

Example Configuration—ControlLogix System

A simple ControlLogix system consists of a standalone controller and I/O modules in a single chassis. For a more comprehensive system, use the following:

- Multiple controllers in a single chassis
- Multiple controllers joined across networks
- I/O in multiple platforms that are distributed in many locations and connected over multiple I/O links



ControlLogix-XT System

ControlLogix-XT™ controllers function the same way as traditional ControlLogix controllers. The ControlLogix-XT products include control and communication system components that are conformally coated to extend product life in harsh, corrosive environments:

- When used with FLEX I/O-XT products, the ControlLogix-XT system can withstand temperatures range from -20…70 °C (-4…158 °F).
- When used independently, the ControlLogix-XT system can withstand temperature ranges from -25...70 °C (-13…158 °F).

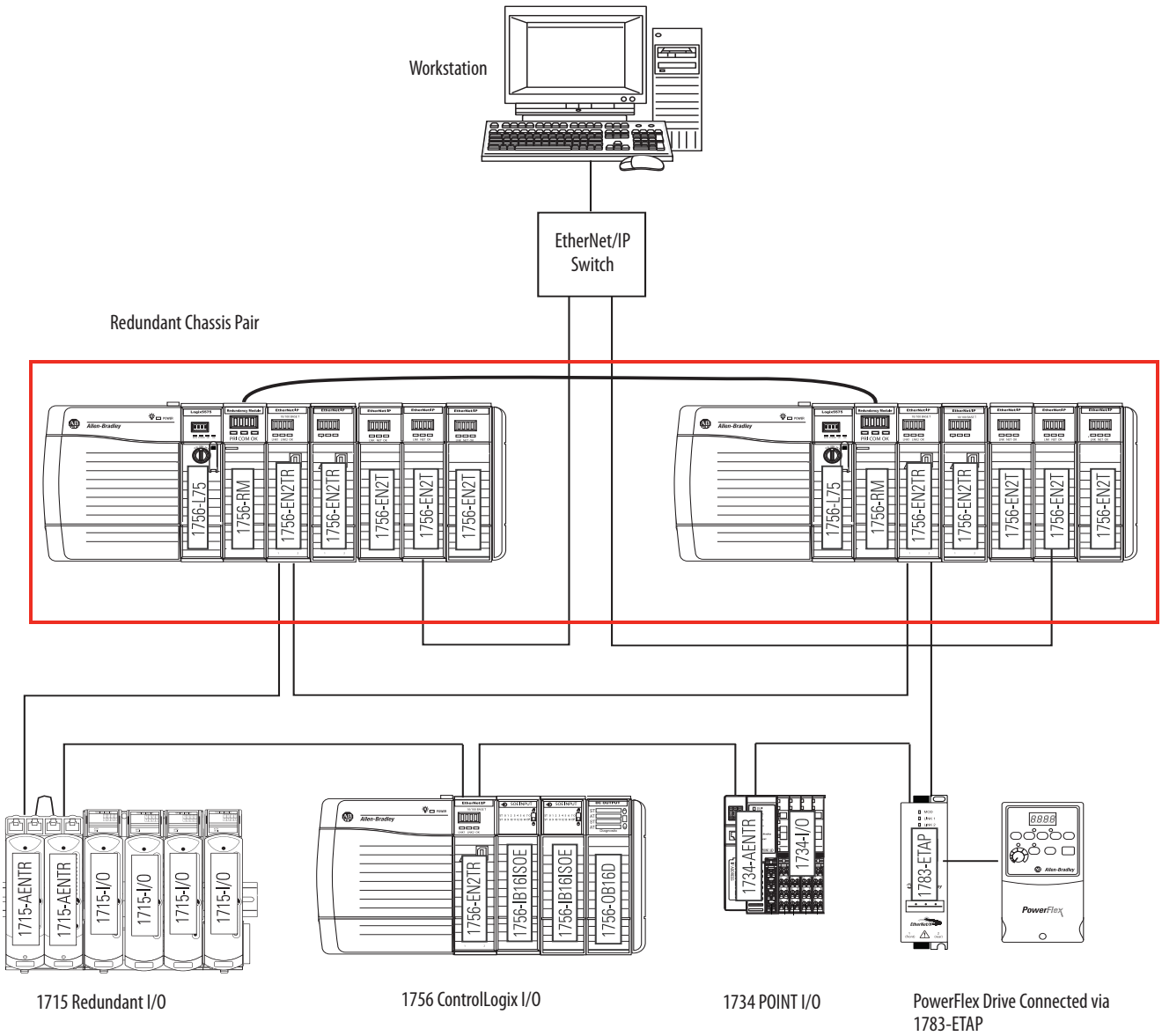
GuardLogix Safety System

A GuardLogix controller is a ControlLogix controller that also provides safety control. The GuardLogix system is a dual controller solution—you must use a GuardLogix controller with the appropriate safety partner to achieve SIL 3/PLe/Cat. 4. A major benefit of this system is that it is still a single project, safety, and standard together. The safety partner controller is a part of the system, is automatically configured, and requires no user setup.

Application	Description
Up to and including SIL 3	The GuardLogix controller system is type-approved and certified for use in safety applications up to and including SIL 3, according to IEC 61508, and applications up to and including category (PLe/Cat. 4), according to ISO 13849-1. For more information, see the following: • GuardLogix Controllers Systems Safety Reference Manual, publication 1756-RM093 • GuardLogix Controllers User Manual, publication 1756-UM020 • GuardLogix Safety Application Instruction Set Reference Manual, publication 1756-RM095
SIL 2	Components of the ControlLogix system are type-approved and certified for use in SIL 2 applications, according to IEC 61508. For a list of ControlLogix system components that meet SIL 2 requirements, see the Using ControlLogix in SIL 2 Applications Safety Reference Manual, publication 1756-RM001.

Example Configuration—Redundant ControlLogix System

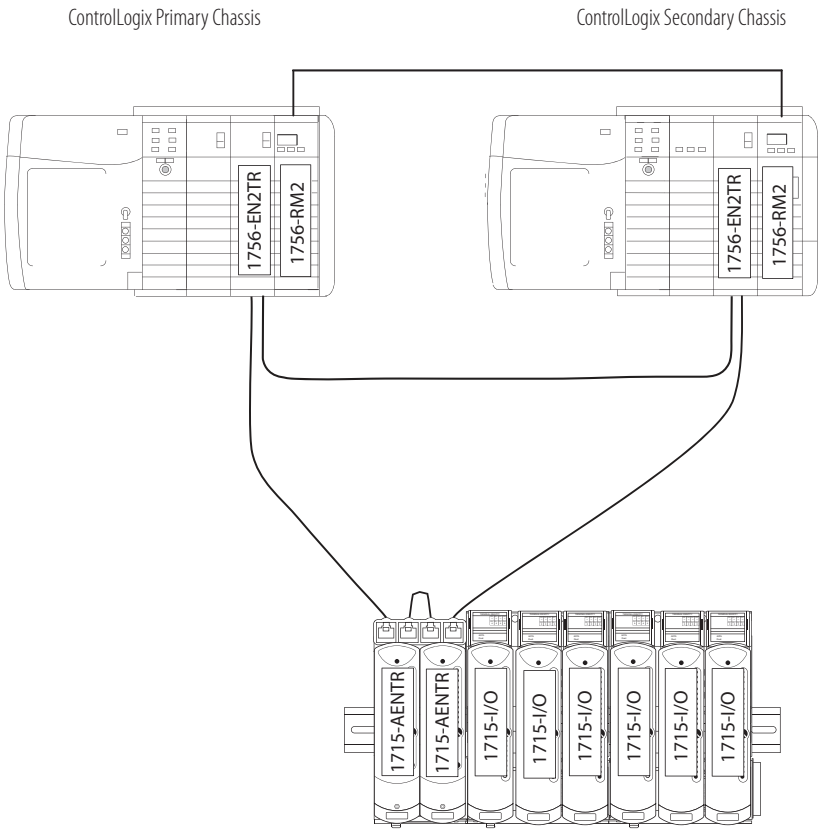
The ControlLogix controller supports controller redundancy.



Example Configuration—Redundant I/O System

The 1715 redundant I/O system lets a ControlLogix controller communicate to a remote, redundant I/O chassis over an EtherNet/IP network. The 1715 redundant I/O system provides fault tolerance and redundancy for critical processes by using a redundant adapter pair and redundant I/O module pairs.

The redundant I/O system must be connected to a ControlLogix system via an EtherNet/IP network. All connections are established via the Ethernet network by using the topologies supported by the 1756-EN2TR communication bridge.



1715 Redundant I/O System

For detailed specifications, see the 1715 Redundant I/O System Specifications Technical Data, publication 1715-TD001.

ControlLogix I/O Modules

The ControlLogix architecture provides a wide range of input and output modules to span many applications, from high-speed digital to process control. The ControlLogix architecture uses a producer/consumer model so that input information and output status can be shared among multiple controllers.

Each ControlLogix I/O module mounts in a ControlLogix chassis and **requires** either a removable terminal block (RTB) or a 1492 interface module (IFM) to connect all field-side wiring. RTBs and IFMs are not included with the I/O modules. They must be ordered separately.

For detailed specifications, see 1756 ControlLogix I/O Modules Specifications Technical Data, publication 1756-TD002.

AC Digital Input Modules

Cat. No.	Inputs/Outputs	Voltage Category	Operating Voltage Range	Removable Terminal Block
1756-IA8D	8 diagnostic inputs (4 points/group)	120V AC	79…132V AC	1756-TBNH 1756-TBSH
1756-IA16	16 inputs (8 points/group)	120V AC	74…132V AC	1756-TBNH 1756-TBSH
1756-IA16I	16 individually isolated inputs	120V AC	74…132V AC	1756-TBCH 1756-TBS6H
1756-IA32	32 diagnostic inputs (4 points/group)	120V AC	74…132V AC	1756-TBCH 1756-TBS6H
1756-IM16I	16 individually isolated inputs	240V AC	159…265V AC	1756-TBCH 1756-TBS6H
1756-IN16	16 inputs (8 points/group)	24V AC	10…30V AC	1756-TBNH 1756-TBSH

AC Digital Output Modules

Cat. No.	Inputs/Outputs	Voltage Category	Operating Voltage Range	Removable Terminal Block
1756-OA8	8 outputs (4 points/group)	120/240V AC	79…265V AC	1756-TBNH 1756-TBSH
1756-OA8D	8 diagnostic, electronically fused outputs (4 points/group)	120V AC	74…132V AC	1756-TBNH 1756-TBSH
1756-OA8E	8 electronically fused outputs (4 points/group)	120V AC	74…132V AC	1756-TBNH 1756-TBSH
1756-OA16	16 mechanically fused/group outputs (8 points/group)	120/240V AC	74…265V AC	1756-TBNH 1756-TBSH
1756-OA16I	16 individually isolated outputs	120/240V AC	74…265V AC	1756-TBCH 1756-TBS6H
1756-ON8	8 outputs (4 points/group)	24V AC	10…30V AC, current > 50 mA 16…30V AC, current < 50 mA	1756-TBNH 1756-TBSH

DC Digital Input Modules

Cat. No.	Inputs/Outputs	Voltage Category	Operating Voltage Range	Removable Terminal Block
1756-IB16	16 inputs (8 points/group)	12/24V DC sink	10...31.2V DC	1756-TBNH 1756-TBSH
1756-IB16D	16 diagnostic inputs (4 points/group)	12/24V DC sink	10...30V DC	1756-TBCH 1756-TBS6H
1756-IB16I	16 individually isolated inputs	12/24V DC sink/source	10...30V DC	1756-TBCH 1756-TBS6H
1756-IB16IF	16 high-speed, individually isolated inputs	12/24V DC sink/source	10. . .30V DC	1756-TBCH 1756-TBS6H
1756-IB16ISOE	16 individually isolated, sequence of events inputs	24/48V DC sink/source	10...55V DC	1756-TBCH 1756-TBS6H
1756-IB32	32 inputs (16 points/group)	12/24V DC sink	10...31.2V DC	1756-TBCH 1756-TBS6H
1756-IC16	16 inputs (8 points/group)	48V DC sink	30...55V DC @ 60 °C (140 °C) 30...60V DC @ 55 °C (131 °C)	1756-TBNH 1756-TBSH
1756-IG16	16 inputs (8 points/group)	5V DC TTL source (Low = True)	4.5...5.5V DC	1756-TBNH 1756-TBSH
1756-IH16I	16 individually isolated inputs	125V DC sink/source	90...146V DC	1756-TBCH 1756-TBS6H
1756-IH16ISOE	16 individually isolated, sequence of events inputs	125V DC sink/source	90...140V DC	1756-TBCH 1756-TBS6H
1756-IV16	16 inputs (8 points/group)	12/24V DC source	10...30V DC	1756-TBNH 1756-TBSH
1756-IV32	32 inputs (16 points/group)	12/24V DC source	10...30V DC	1756-TBCH 1756-TBS6H

DC Digital Output Modules

Cat. No.	Inputs/Outputs	Voltage Category	Operating Voltage Range	Removable Terminal Block
1756-OB8	8 outputs	12/24V DC source	10...30V DC	1756-TBNH 1756-TBSH
1756-OB8EI	8 electronically fused, individually isolated outputs	12/24V DC source	10...30V DC	1756-TBCH 1756-TBS6H
1756-OB8I	8 individually isolated outputs	12/24V DC source	10...30V DC	1756-TBCH 1756-TBS6H
1756-OB16D	16 diagnostic outputs (8 points/group)	24V DC source	19.2...30V DC	1756-TBCH 1756-TBS6H
1756-OB16E	16 electronically fused outputs (8 points/group)	12/24V DC source	10...31.2V DC	1756-TBNH 1756-TBSH
1756-OB16I	16 individually isolated outputs	12/24V DC sink/source	10...30V DC	1756-TBCH 1756-TBS6H
1756-OB16IEF	16 high-speed, individually isolated, electronically-fused outputs	24V DC sink/source	10...30V DC	1756-TBCH 1756-TBS6H
1756-OB16IEFS	16 scheduled, high-speed, individually isolated, electronically-fused outputs	24V DC sink/source	10...30V DC	1756-TBCH 1756-TBS6H
1756-OB16IS	16 individually isolated outputs 8 scheduled outputs	12/24V DC sink/source	10...30V DC	1756-TBCH 1756-TBS6H
1756-OB32	32 outputs (16 points/group)	12/24V DC source	10...31.2V DC	1756-TBCH 1756-TBS6H
1756-OC8	8 outputs (4 points/group)	48V DC source	30...60V DC	1756-TBNH 1756-TBSH
1756-OG16	16 (8 points/group)	5V DC TTL source (Low=True)	4.5...5.5V DC	1756-TBNH 1756-TBSH
1756-OH8I	8 individually isolated outputs	120V DC	90...146V DC	1756-TBCH 1756-TBS6H
1756-OV16E	16 electronically fused outputs (8 points/group)	12/24V DC sink	10...30V DC	1756-TBNH 1756-TBSH
1756-OV32E	32 electronically fused outputs (16 points/group)	12/24V DC sink	10...30V DC	1756-TBCH 1756-TBS6H

Contact Output Modules

Cat. No.	Inputs/Outputs	Operating Voltage Range	Removable Terminal Block
1756-OW16I	16 normally open, individually isolated outputs	5...150V DC 10...265V AC	1756-TBCH 1756-TBS6H
1756-OX8I	8 normally open 8 normally closed, individually isolated outputs (2 points/group)	5...150V DC 10...265V AC	1756-TBCH 1756-TBS6H

Analog Input Modules

Cat. No.	Inputs/Outputs	Range	Resolution	Removable Terminal Block
1756-IF6CIS	6 individually isolated inputs, current sourcing	0...21 mA	16 bits 0.34 µA/bit	1756-TBNH 1756-TBSH
1756-IF6I	6 individually isolated inputs	±10.5V 0...10.5V 0...5.25V 0...21 mA	16 bits 10.5V: 343 µV/bit 0...10.5V: 171 µV/bit 0...5.25V: 86 µV/bit 0...21 mA: 0.34 µA/bit	1756-TBNH 1756-TBSH
1756-IF8	8 single-ended inputs 4 differential inputs 2 high-speed differential inputs	±10.25V 0...10.25V 0...5.125V 0...20.5 mA	±10.25V: 320 µV/cnt (15 bits plus sign bipolar) 0...10.25V: 160 µV/cnt (16 bits) 0...5.125V: 80 µV/cnt (16 bits) 0...20.5 mA: 0.32 µA/cnt (16 bits)	1756-TBCH 1756-TBS6H
1756-IF8H	8 differential voltage or current inputs, HART interface	±10V 0...5V 1...5V 0...10V 0...20 mA 4...20 mA	16...21 bits	1756-TBCH 1756-TBS6H
1756-IF16	16 single-ended inputs 8 differential or 4 differential (high speed) inputs	±10.5V 0...10.5V 0...5.25V 0...21 mA	16 bits 10.5V: 343 µV/bit 0...10.5V: 171 µV/bit 0...5.25V: 86 µV/bit 0...21 mA: 0.34 µA/bit	1756-TBCH 1756-TBS6H
1756-IF16H	16 differential current inputs, HART interface	0...20 mA 4...20 mA	16...21 bits	1756-TBCH 1756-TBS6H

Analog RTD and Thermocouple Modules

Cat. No.	Inputs/Outputs	Range	Resolution	Removable Terminal Block
1756-IR6I	6 individually isolated RTD inputs	1...487 Ω 2...1000 Ω 4...2000 Ω 8...4020 Ω	16 bits 1...487 Ω: 7.7 mΩ/bit 2...1000 Ω: 15 mΩ/bit 4...2000 Ω: 30 mΩ/bit 8...4020 Ω: 60 mΩ/bit	1756-TBNH 1756-TBSH
1756-IT6I	6 individually isolated thermocouple inputs 1 CJC	-12...78 mV -12...30 mV	16 bits -12...78 mV: 1.4 µV/bit -12...30 mV: 0.7 µV/bit	1756-TBNH 1756-TBSH
1756-IT6I2	6 individually isolated thermocouple inputs 2 CJC	-12...78 mV (1.4 µV per bit) -12...30 mV (0.7 µV per bit, high-resolution range)	16 bits -12...78 mV: 1.4 µV/bit -12...30 mV: 0.7 µV/bit	1756-TBNH 1756-TBSH

Analog Output Modules

Cat. No.	Inputs/Outputs	Range	Resolution	Removable Terminal Block
1756-OF4	4 voltage or current outputs	±10.4V 0...21 mA	Voltage: 15 bits across 10.5V, 320 μV/bit Current: 15 bits across 21 mA, 650 nA/bit	1756-TBNH 1756-TBSH
1756-OF6CI	6 individually isolated outputs, current	0...21 mA	13 bits across 21 mA (2.7 μA)	1756-TBNH 1756-TBSH
1756-OF6VI	6 individually isolated outputs, voltage	±10.5V	14 bits across 21V (1.3 mV) (13 bits across 10.5V +sign bit)	1756-TBNH 1756-TBSH
1756-OF8	8 voltage or current outputs	±10.4V 0...21 mA	15 bits across 21 mA - 650 nA/bit 15 bits across 10.4V - 320 μV/bit	1756-TBNH 1756-TBSH
1756-OF8H	8 voltage or current outputs, HART interface	±10.4V 0...20 mA 4...20 mA	15...16 bits	1756-TBNH 1756-TBSH

Analog Combination Input and Output Module

Cat. No.	Inputs/Outputs	Range	Resolution	Removable Terminal Block
1756-IF4FXOF2F	4 high-speed, sub-millisecond, differential inputs 2 high-speed voltage or current outputs	Input: ±10.5V 0...10.5V 0...5.25V 0...21 mA Output: ±10.4V 0...21 mA	Input: Approx. 14 bits across ±10V DC (21V total) ±10V: 1.3 mV/bit, 14-bit effective 0...10.5V: 1.3 mV/bit, 13-bit effective 0...5.25V: 1.3 mV/bit, 12-bit effective Approx. 12 bits across 21 mA 0...21 mA: 5.25 μA/bit Output: 13 bits across 21 mA = 2.8 μA/bit 14 bits across 21.8V = 1.3 mV/bit	1756-TBCH 1756-TBS6H

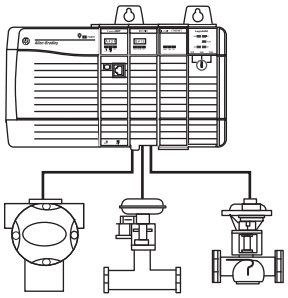
Specialty I/O Modules

Cat. No.	Inputs/Outputs	Description	Removable Terminal Block
1756-CFM	4 inputs (2 per channel) 2 outputs, current sourcing	Configurable flowmeter module 2 Flowmeter (F) inputs used for all modes 2 Gate inputs used in Totalizer mode for prover/store count	1756-TBNH 1756-TBSH
1756-HSC	2 counters, each with 3 inputs (A, B, Z for gate/reset) 4 outputs (2 points/group)	High-speed counter module 5V operation: 4.5...5.5V DC 12/24V operation: 10...31.2V DC	1756-TBCH 1756-TBS6H
1756-LSC8XIB8I	8...24V DC counters 8 high-speed 24V DC inputs	Low speed counter module 8...40 kHz 24V DC counters 8 high-speed 24V DC auxiliary inputs	1756-TBCH 1756-TBS6H
1756-PLS	Left section: 2 groups of 4 outputs and 4 inputs each Center section: resolver interface and I/O control Right section: 2 groups of 4 outputs and 4 inputs each	Programmable limit switch module	Requires 3 RTBs: 1756-TBNH or 1756-TBSH

HART Smart Instrumentation

HART (Highway Addressable Remote Transmitter) is an open protocol designed to connect analog devices. For HART connectivity, select products available from Rockwell Automation and our Encompass™ partners.

Typical HART Configuration



ControlLogix Controller with 1756-IF8H or 1756-OF8H module

HART Devices

HART Interfaces

If your application has	Select	Description
Analog and HART connectivity in one module No external hardware required to access HART signal HART commands can be transmitted as unscheduled messages Supports asset management software to HART device	1756-IF8H 1756-IF16H 1756-OF8H	Rockwell Automation analog I/O modules
Data acquisition or control application with slow update requirements (such as a tank farm) No external hardware required to access HART signal Does not connect directly to asset management software	MVI56-HART	Prosoft interface
Analog and HART in one module Instrumentation in hazardous locations (FLEX Ex™ modules) HART commands can be transmitted as unscheduled messages Directly connects asset management software to HART devices	1794 FLEX I/O 1797 FLEX Ex I/O	There are specific FLEX I/O and FLEX Ex modules designed for HART systems. These catalog numbers end in an H, such as 1797-IE8H.

Accessories—I/O Modules

1756 Removable Terminal Blocks

Removable terminal blocks (RTBs) provide a flexible interconnection between your plant wiring and 1756 I/O modules. The RTB plugs into the front of the I/O module. The type of module determines which RTB you need. You can choose screw-clamp or spring-clamp RTBs.

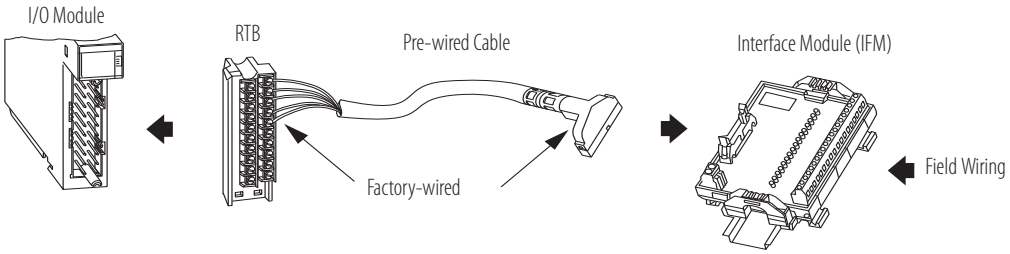
RTBs are not shipped with I/O modules. You must order them separately. The standard housing on the front of the wiring arm is not deep enough for 2.5 mm^2 (14 AWG) wiring. If you plan to use 2.5 mm^2 (14 AWG) wiring, also order the extended housing.

Attribute	1756-TBNH	1756-TBSH	1756-TBCH	1756-TBS6H	1756-TBE
Description	20-position NEMA screw-clamp removable block	20-pin spring-clamp removable terminal block with standard housing	36-pin cage-clamp removable terminal block with standard housing	36-pin spring-clamp removable terminal block with standard housing	Extended depth terminal block housing
Screw torque	0.8...1 N•m 7...9 lb•in		0.4 N•m 4.4 lb•in		—

Wiring Systems

As an alternative to buying RTBs and connecting the wires yourself, you can buy a wiring system of the following:

- Interface modules (IFMs) that provide the I/O terminal blocks for digital I/O modules. Use the pre-wired cables that match the I/O module to the IFM.
- Analog interface modules (AIFMs) that provide the I/O terminal blocks for analog I/O modules. Use the pre-wired cables that match the I/O module to the AIFM.
- I/O module-ready cables. One end of the cable assembly is an RTB that plugs into the front of the I/O module. The other end has individually color-coded conductors that connect to a standard terminal block.



ControlLogix Integrated Motion

The Logix architecture supports motion control components that work in a wide variety of machine architectures:

- Integrated motion on the EtherNet/IP network supports a connection to Ethernet drives.
- The Kinetix integrated-motion solution uses a SERCOS or EtherNet/IP interface to perform multi-axis, synchronized motion.
- Logix integrated motion supports the analog family of servo modules for controlling drives/actuators.
- Networked motion provides the ability to connect via the DeviceNet network to a single axis drive to perform point-to-point indexing.

For detailed specifications on motion interface modules, see the 1756 ControlLogix Integrated Motion Specifications Technical Data, publication 1756-TD004.

For more information, see these publications:

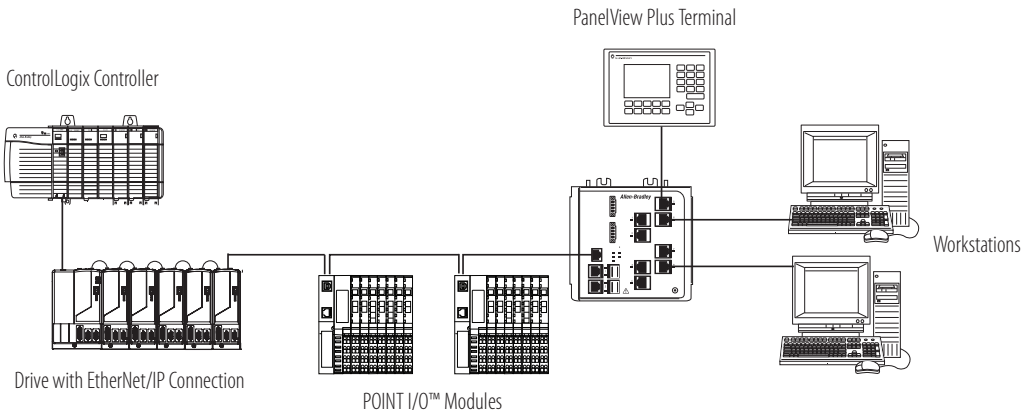
- Motion Analyzer CD to size your motion application and to make final component selection

  Download the software from http://www.ab.com/motion/software/analyzer.html

- Kinetix Motion Control Selection Guide, publication GMC-SG001, to verify drive, motor, and accessory specifications

Integrated Motion on an EtherNet/IP Network

Product	Consideration
Drive that supports EtherNet/IP connections	Unlimited velocity, torque, and VHz configured drives: • Kinetix 6500 drives • Kinetix 5500 drives • Kinetix 350 drives • PowerFlex 755 drives
ControlLogix controller	As many as 100 drives per controller
ControlLogix EtherNet/IP communication module	• 1…8 position loop axes configured with the 1756-EN2TR module • 1…128 position loop axes configured with the 1756-EN3TR module

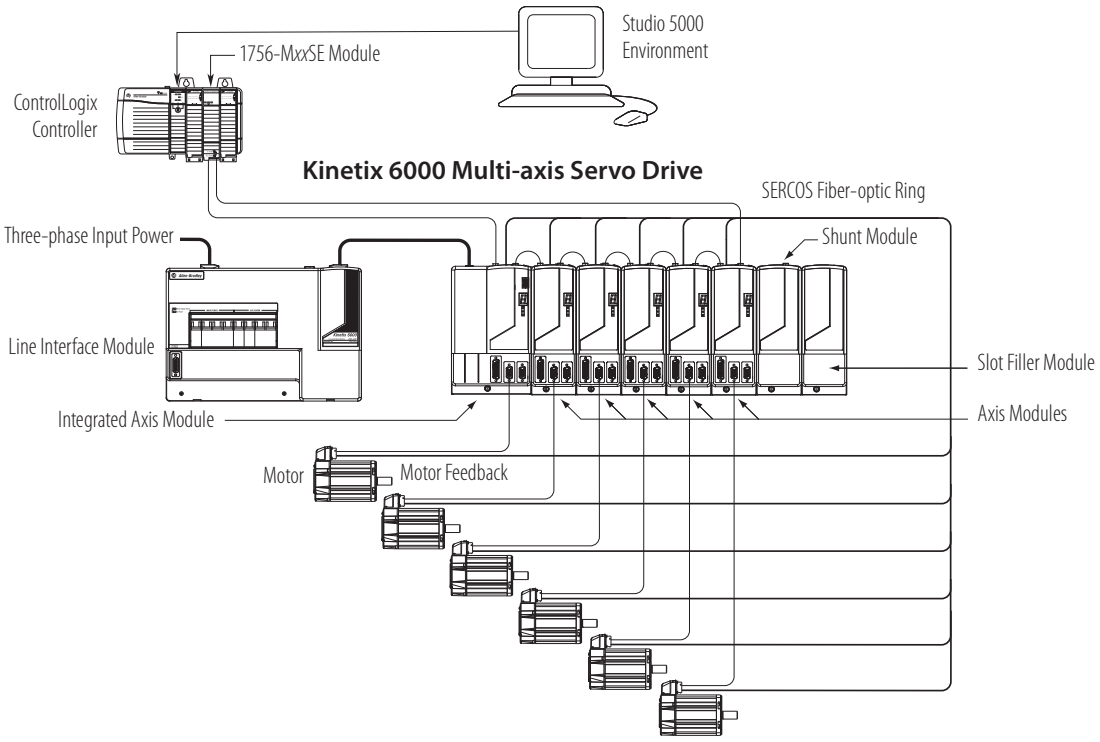


SERCOS Interface Modules

Cat. No.	Description	Number of Axes
1756-M16SE	Rockwell Automation® SERCOS interface modules	16
1756-M08SE		8
1756-M03SE		3
1756-M08SEG	SERCOS interface drives that are Extended Pack Profile compliant	8

The SERCOS interface modules can connect to these servo drives:

- 2093 Kinetix 2000 multi-axis servo drive
- 2094 Kinetix 6000 multi-axis servo drive
- 2099 Kinetix 7000 high-power servo drive
- 2098 Ultra™3000 SERCOS servo drive



Analog Motion Interface Modules

Cat. No.	Description	Number of Axes
1756-M02AE	Analog servo interface drives with quadrature feedback	2
1756-HYD02	Analog, hydraulic servo interface drives LDT feedback	2
1756-M02AS	Analog servo interface drives with SSI feedback	2

ControlLogix Communication Modules

Separate communication modules are available for different networks. Install multiple communication modules into the ControlLogix backplane to bridge or route control and information data between different networks. You can route a message through a maximum of four chassis (eight communication hops). You do not need a ControlLogix controller in the chassis.

Application	Network	Page
• Plant management (material handling) • Configuration, data collection, and control on a single, high-speed network • Time-critical applications with no established schedule • Inclusion of commercial technologies (such as video over IP) • Internet/Intranet connection • Integrated CIP motion and safety • Redundant controller systems	EtherNet/IP	19
• High-speed transfer of time-critical data between controllers and I/O devices • Deterministic and repeatable data delivery • Media redundancy • Intrinsic safety • Redundant controller systems	ControlNet	21
• Connections of low-level devices directly to plant floor controllers, without interfacing them through I/O modules • Data sent as needed • More diagnostics for improved data collection and fault detection • Less wiring and reduced start-up time than a traditional, hard-wired system	DeviceNet	22
• Plant-wide and cell-level data sharing with program maintenance • Data sent regularly • Transfer of information between controllers	Data Highway Plus	23
• Connections between controllers and I/O adapters • Data sent regularly • Distributed control so that each controller has its own I/O and communicates with a supervisory controller	Remote I/O	23
• Fieldbus transmitters and actuators • Closed-loop control • Process automation	Foundation Fieldbus	25

For detailed specifications, see the 1756 ControlLogix Network Specifications Technical Data, publication 1756-TD003.

EtherNet/IP Communication Modules

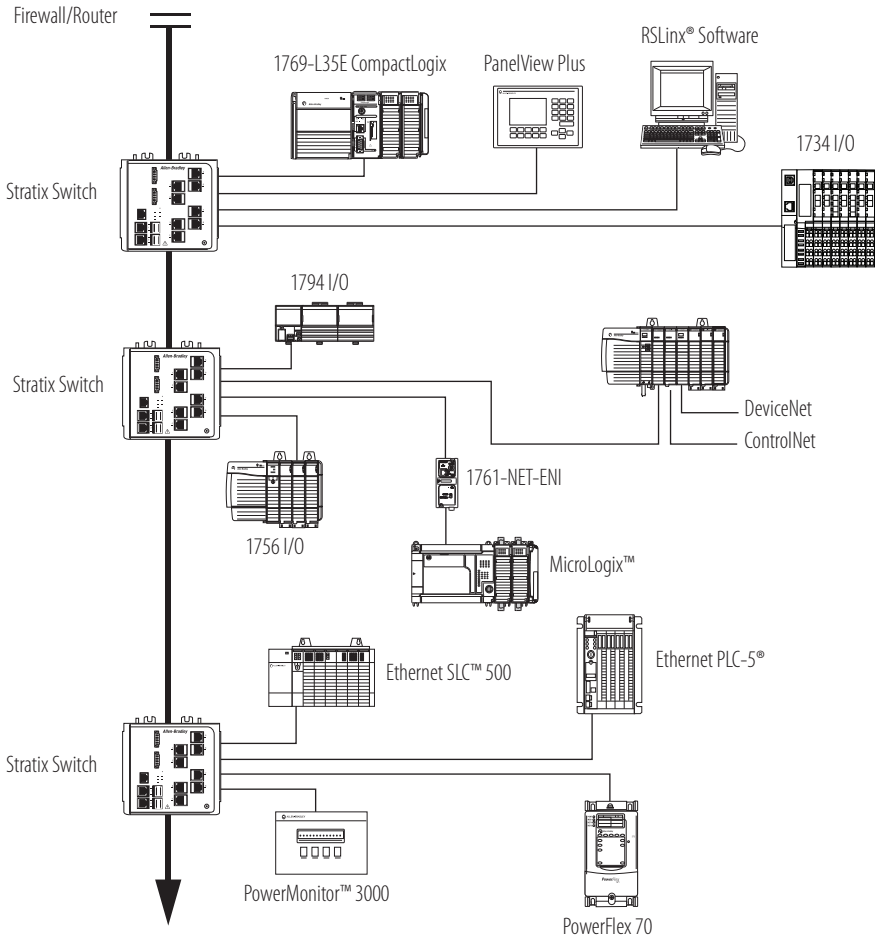
EtherNet/IP (Ethernet Industrial Protocol) is an open industrial-networking standard that supports both real-time I/O messaging and message exchange. The EtherNet/IP network uses off-the-shelf Ethernet communication chips and physical media.

Cat. No.	Description	Media	Communication Rate	CIP Motion Axes, max	TCP/IP Connections	Logix Connections
1756-EN2F	EtherNet/IP bridge, fiber	Fiber	100 Mbps	8	128	256
1756-EN2T	EtherNet/IP bridge, copper	Copper	10/100 Mbps	8	128	256
1756-EN2TR	EtherNet/IP bridge, embedded switch, copper	Dual copper	10/100 Mbps	8	128	256
1756-EN3TR	EtherNet/IP bridge, embedded switch, copper	Dual copper	10/100 Mbps	128	128	256
1756-ENBT	EtherNet/IP bridge, copper	Copper	10/100 Mbps	—	64	128
1756-EWEB	Ethernet web server module	Copper	10/100 Mbps	—	64	128
1756-EN2TXT	ControlLogix-XT, extended temperature EtherNet/IP bridge, copper for extreme environments	Copper	10/100 Mbps	8	128	256

Accessories—EtherNet/IP Network

Cat. No.	Description	Specifications
1585J-M8PBJM-*x*	Ethernet RJ45 patchcord *x* = 2 (2 m), 5 (5 m) or 10 (10 m)	8 conductor, Teal Riser PVC cable (Flex Rated cable also available)
1585J-M8CC-H	RJ45 insulation displacement connector (IDC)	0.128…0.325 mm^2 (26…22 AWG), Cat. 6, IDC, no tool required
1585J-M8CC-C	RJ45 crimp connector with boot, qty = 50 pieces	0.128…0.205 mm^2 (26…24 AWG, Cat. 5e, requires crimp tool for assembly
1585A-Jcrimp	Crimp tool	—
9300-RADES	Remote access dial-in kit	56 Kbps modem connection to devices on an Ethernet network includes the following: • Pre-configured modem • Communication module • DIN rail mounting hardware • Associated cables

Example Configuration—EtherNet/IP Network



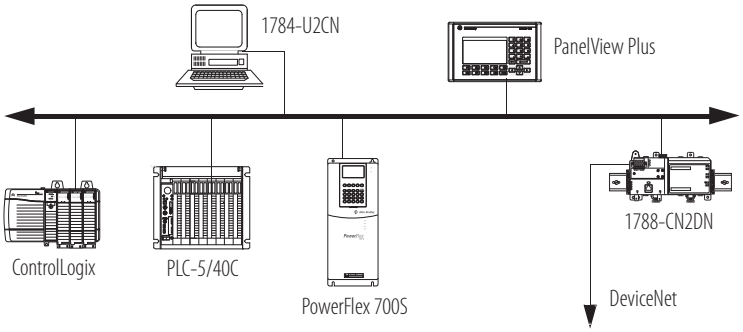
ControlNet Communication Modules

The ControlNet network combines the functionality of an I/O network and a peer-to-peer network, providing high-speed performance. The ControlNet network provides deterministic, repeatable transfers of critical control data.

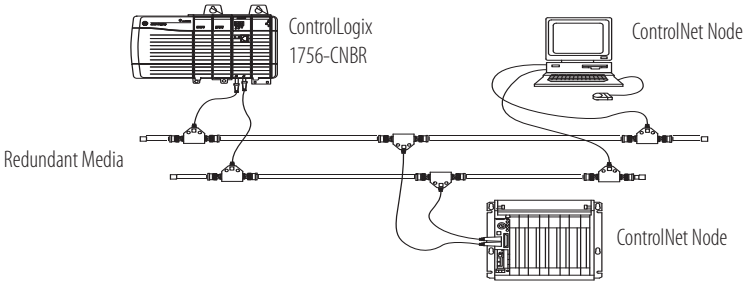
Cat. No.	Description	Communication Rate	Logix Connections	Number of Nodes
1756-CN2/B	ControlNet bridge, standard media	5 Mbps	128(1)	99
1756-CN2R/B	ControlNet bridge, redundant media	5 Mbps	128(1)	99
1756-CNB	ControlNet bridge, standard media	5 Mbps	64(2)	99
1756-CNBR	ControlNet bridge, redundant media	5 Mbps	64(2)	99
1756-CN2RXT	ControlLogix-XT, extended temperature ControlNet bridge, redundant media	5 Mbps	128(1)	99

(1) 128 connections are available for standard use. An additional three connections are reserved for redundant control.
(2) Recommend using only 40...48 Logix connections for I/O.

Example Configuration—ControlNet Network



Example Configuration—Redundant ControlNet Media



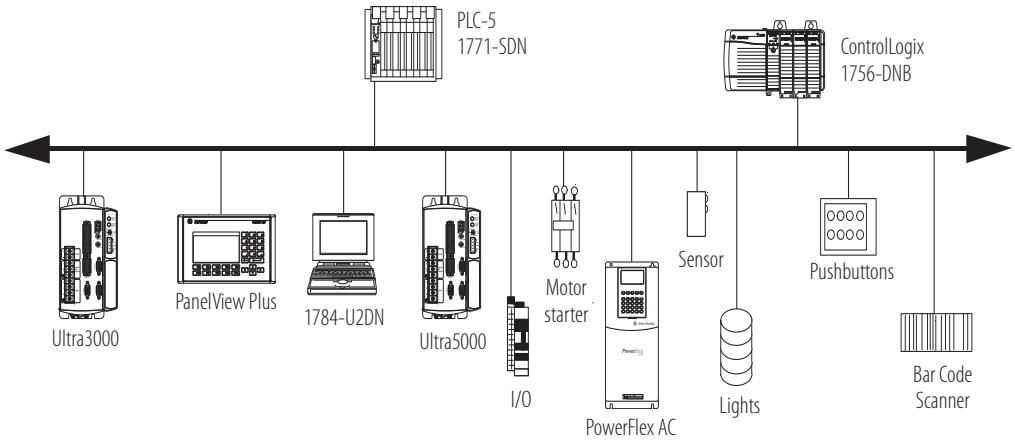
For information on ControlNet media, see the ControlNet Media System Components List, publication AG-PA002.

DeviceNet Communication Module

The DeviceNet network provides connections between simple, industrial devices (such as sensors and actuators) and higher-level devices (such as controllers and computers).

Cat. No.	Description	Communication Rate	Number of Nodes
1756-DNB	DeviceNet bridge	125 Kbps (500 m max) 250 Kbps (250 m max) 500 Kbps (100 m max)	64

Example Configuration—DeviceNet Network



Accessories—DeviceNet Network

Cat. No.	Description
KwikLink™ Lite flat media	KwikLink Lite flat media is a newer, ODVA-approved solution for wiring DeviceNet networks. Drop-lines for connecting nodes are added by using the KwikLink Lite two-piece connectors. This cable system supports the intermixing of DeviceNet cable types (thin-round with flat). All of the KwikLink Lite connectors provide insulation displacement technology with reduced assembly time.
KwikLink flat media	The KwikLink flat media system provides a modular cabling method with its flat 4-wire cable and insulation displacement connectors (IDCs). The KwikLink system allows nodes to be added to the network without severing the trunkline. Cutting or stripping of the trunkline is eliminated, as is the need for predetermined cable lengths.
Round media	Round trunk cable is available in bulk spools or as pre-molded cord sets or patchcords in varying lengths. A wide variety of rugged, durable DeviceNet components is available for use in round trunk systems. Stainless steel versions of round cable system components are also available: • Thick-trunk round media systems use thick cable for maximum DeviceNet trunk line length. • Round media thin-trunk systems use thin cable to reduce maximum trunk line distances with a more compact and cost-effective installation for some applications. Thin-cable outer jacket material is TPE for additional chemical resistance.

Data Highway Plus and Remote I/O Communication Modules

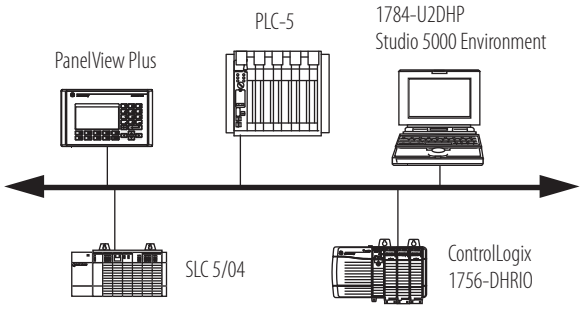
The Data Highway Plus network supports messaging between devices. The remote I/O link connects to remote I/O chassis and other intelligent devices.

The 1756-DHRIO module supports messaging between devices on DH+™ networks. The remote I/O functionality enables the module to act as a scanner for transferring digital and block-transfer data to and from remote I/O devices.

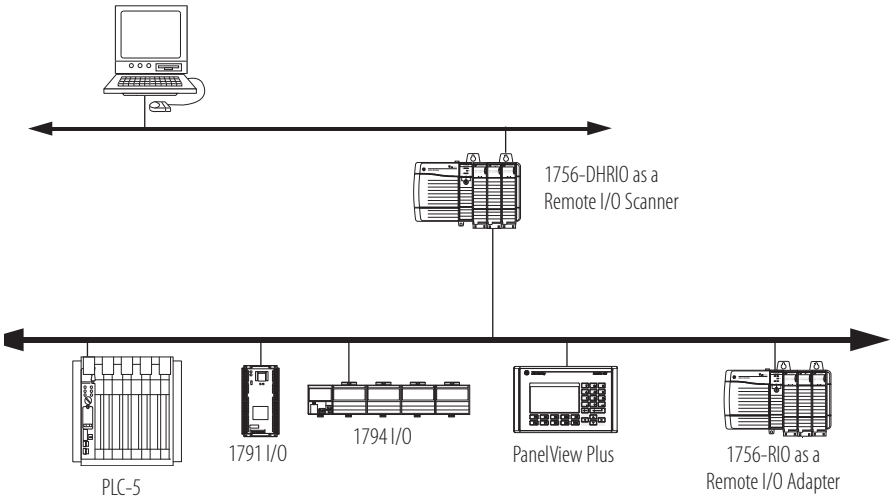
The 1756-RIO module can act as a scanner or adapter on a remote I/O network. In addition to digital and block-transfer data, the 1756-RIO module transfers analog and specialty data without message instructions.

Cat. No.	Description	Communication Rate	DH+ Connections	RIO Connections	Maximum Recommended Logix Connections
1756-DHRIO	Data Highway Plus/Remote I/O two-channel communication module	57.6 Kbps, 115.2 Kbps, 230.4 Kbps	32 DH+ messages per DH+ module	Remote I/O scanner only 32 logical rack connections per remote I/O channel 16 block-transfer connections per remote I/O channel	32
1756-RIO	Remote I/O communication module	57.6 Kbps, 115.2 Kbps, 230.4 Kbps	—	Remote I/O scanner or adapter 32 physical racks (0...76), any combination of rack size and block transfers	10 scheduled I/O
1756-DHRIOXT	ControlLogix-XT, extended temperature Data Highway Plus/Remote I/O two-channel communication module	57.6 Kbps, 115.2 Kbps, 230.4 Kbps	32 DH+ messages per DH+ module	Remote I/O scanner only 32 logical rack connections per remote I/O channel 16 block-transfer connections per remote I/O channel	32

Example Configuration—DH+ Network



Example Configuration—Remote I/O Network



Accessories—DH+ and Remote I/O Networks

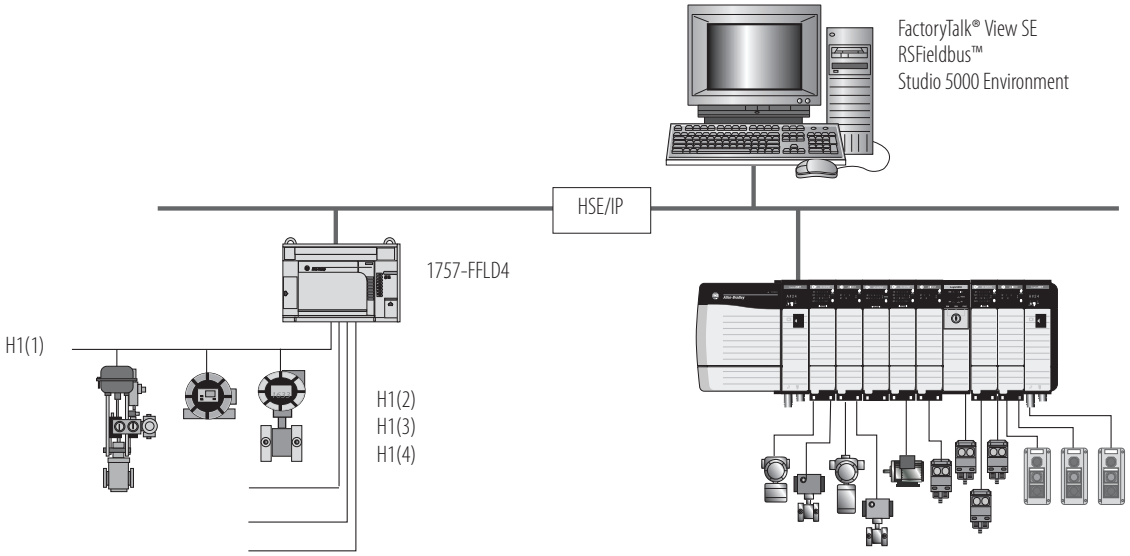
Cat. No.	Description	Specifications
1770-CD	Cable to connect communication module to DH+ network	Belden 9463 twinaxial
9300-RADKIT	Remote access dial-in kit	56 Kbps modem connection to devices on a DH+ network includes the following: • Pre-configured modem • Communication module • DIN rail mounting hardware • Associated cables

FOUNDATION Fieldbus Linking Devices

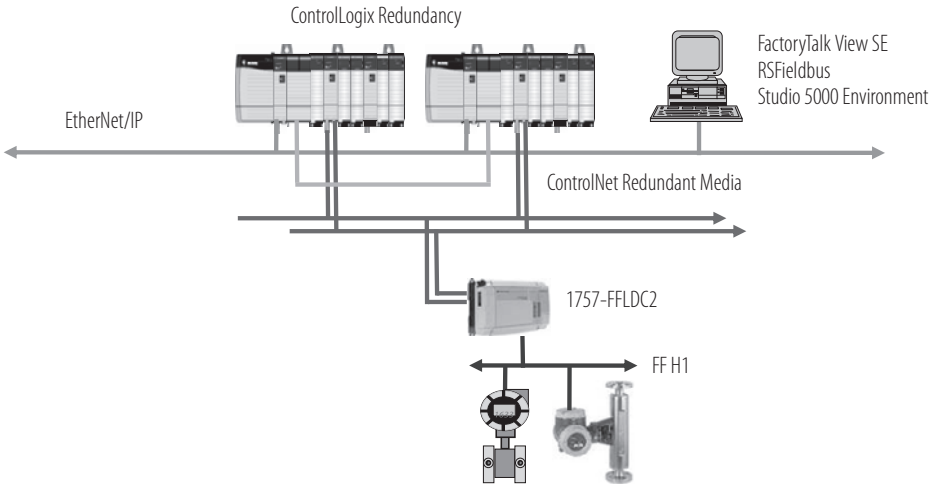
The FOUNDATION Fieldbus protocol is a network designed for distributed control of process applications.

Cat. No.	Description	Communication Rate	Number of H1 Ports	Devices per H1 Link	Devices per Linking Device
1757FFLD2	FOUNDATION Fieldbus bridge to an Ethernet network	FOUNDATION Fieldbus: 31.25 Kbps EtherNet/IP: 10/100 Mbps	2	16 (8…10 recommended)	32
1757-FFLD4			4		64
1757-FFLDC2	FOUNDATION Fieldbus bridge to a ControlNet network	FOUNDATION Fieldbus: 31.25 Kbps ControlNet: 5 Mbps	2	16 (8…10 recommended)	32
1757-FFLDC4			4		64

Example Configuration—Bridge to EtherNet/IP Network



Example Configuration—Bridge to ControlNet Network



Other Connectivity Options

Option	Consideration
USB connection	The ControlLogix L7 controller has a USB port in place of the serial port.(1) If your application requires RS-232 functionality, see the many Encompass partners at http://www.rockwellautomation.com/encompass.
Serial connection	The serial port on the 1756-L6 controller is compatible with RS-232 serial communication. The serial port supports the DF1 protocol to communicate with other devices on the serial link. To use Logix5000™ controllers on Modbus, you connect through the serial port and execute a specific ladder logic routine. The controller project is available with the Studio 5000™ Logix Designer application. For more information, see Using Logix5000 Controllers as Masters or Slaves on Modbus Application Solution, publication CIG-AP129.
DH-485 network	The controller serial port is compatible with DH-485 communication. The DH-485 connection does support remote programming and monitoring via the Logix Designer application. Or, add a 1756-DH485 communication module.
SynchLink network	The SynchLink communication module (1756-SYNCH) provides time synchronization and data broadcasting capabilities for distributed motion and coordinated drive control. The module connects a ControlLogix chassis to a SynchLink fiber-optic communication link.

(1) The USB port is intended for temporary local programming purposes only and not intended for permanent connection. Do not use the USB port in hazardous locations.

ControlLogix Controllers

The ControlLogix controller provides a scalable controller solution that is capable of addressing a large amount of I/O points.

The controller can be placed into any slot of a ControlLogix chassis and multiple controllers can be installed in the same chassis. Multiple controllers in the same chassis communicate with each other over the backplane (just as controllers can communicate over networks) but operate independently.

ControlLogix controllers can monitor and control I/O across the ControlLogix backplane, as well as over I/O links. ControlLogix controllers can communicate over EtherNet/IP, ControlNet, DeviceNet, DH+, Remote I/O, and RS-232-C (DF1/DH-485 protocol) networks and many third party process and device networks. To provide communication for a ControlLogix controller, install the appropriate communication interface module into the chassis.

Cat. No.	Description	User Memory
1756-L71	ControlLogix controller, 1 built-in USB port(1)	2 MB
1756-L72		4 MB
1756-L73		8 MB
1756-L74		16 MB
1756-L75		32 MB
1756-L61	ControlLogix controller, 1 built-in RS-232 port	2 MB
1756-L62		4 MB
1756-L63		8 MB
1756-L64*	*Important: Scan time for a project loaded in a 1756-L64 or 1756-L65 controller may be slower than for the same project loaded in one of the other 1756-L6 controllers. See the Logix5000 Controllers Instruction Execution Time and Memory Use Reference Manual, publication 1756-RM087, for instruction execution times.	16 MB
1756-L65*		32 MB
1756-L63XT	ControlLogix-XT controller, extreme environment	8 MB
1756-L73XT		8 MB
1756-L61S	GuardLogix safety controller	2 MB standard 1 MB safety
1756-L62S		4 MB standard 1 MB safety
1756-L63S		8 MB standard 3.75 MB safety
1756-L71S		2 MB standard 1 MB safety
1756-L72S		4 MB standard 2 MB safety
1756-L73S		8 MB standard 4 MB safety
1756-LSP	GuardLogix safety partner (one is required for each GuardLogix L6 controller)	—
1756-L7SP	GuardLogix safety partner (one is required for each GuardLogix L7 controller)	—

(1) The USB port is intended for temporary local programming purposes only and not intended for permanent connection. Do not use the USB port in hazardous locations.

For detailed specifications, see the 1756 ControlLogix Controllers Specifications Technical Data, publication 1756-TD001.

Standard ControlLogix Controllers

The ControlLogix controller is part of the Logix5000 family of controllers. A ControlLogix system includes the following:

- The ControlLogix controller, available in different combinations of user memory
- Studio 5000 environment
- 1756 ControlLogix I/O modules that reside in a 1756 chassis
- Separate communication modules for network communication

Feature	1756-L61, 1756-L62, 1756-L63, 1756-L64, 1756-L65	1756-L71, 1756-L72, 1756-L73, 1756-L74, 1756-L75
Controller tasks	• 32 tasks • 100 programs/task • Event tasks: all event triggers	
Built-in communication ports	1 port RS-232 serial	1 port USB
Communication options	• EtherNet/IP • ControlNet • DeviceNet • Data Highway Plus • Remote I/O • SynchLink • Third-party process and device networks	
Built-in port	Serial	USB
Controller connections supported, max	250	500
Network connections, per network module	• 256 EtherNet/IP; 128 TCP (1756-EN2*x*, 1756-EN3*x*) • 128 EtherNet/IP; 64 TCP (1756-ENBT) • 128 ControlNet (1756-CN2/B, 1756-CN2R/B) • 64 DeviceNet (1756-DNB)	
Controller redundancy	Full support	
Integrated motion	• EtherNet/IP connection • SERCOS interface • Analog options (encoder input, LDT input, SSI input)	
Programming languages	• Relay ladder • Structured text • Function block • Sequential function chart (SFC)	

ControlLogix-XT Controllers

The ControlLogix-XT controllers function in the same way as the traditional ControlLogix controllers and have the same features as the ControlLogix L6 and L7 controllers.

The ControlLogix-XT products include control and communication system components that are conformally coated to extend product life in harsh, corrosive environments:

- When used with FLEX I/O-XT products, the ControlLogix-XT system can withstand temperatures range from -20...70 °C (-4...158 °F).
- When used independently, the ControlLogix-XT system can withstand temperature ranges from -25...70 °C (-13...158 °F).

Redundant ControlLogix Controllers

The ControlLogix controller supports controller redundancy. In a redundant controller system, you need these components:

- Two 1756 chassis each with the following the same:
  - Number of slots
  - Modules in the same slots
  - Redundancy firmware revisions in each module
  - Two additional ControlNet nodes(1) outside the redundant chassis pair.
- One 1756-RM2 or 1756-RMXT module per chassis that supports the following:
  - One or two ControlLogix or ControlLogix-XT controllers of the same family
  - As many as seven ControlNet or EtherNet/IP communication modules, depending on the firmware revision
- One 1756-RMC*x* cable

For additional redundancy rules and restrictions, see publication 1756-UM535.

(1) For a ControlNet I/O drop, two additional ControlNet nodes are required outside the redundancy chassis pair.

GuardLogix Controllers

A GuardLogix controller is a ControlLogix controller that also provides safety control.

Application	Description
SIL 1, 2, 3	The GuardLogix controller system is type-approved and certified for use in safety applications up to and including SIL 3 according to IEC 61508, and applications up to and including PLe/Cat.4 according to ISO 13849-1. For more information, see the following: • GuardLogix Controllers Systems Safety Reference Manual, publication 1756-RM093. • GuardLogix Controllers User Manual, publication 1756-UM020. • GuardLogix Safety Application Instruction Set Reference Manual, publication 1756-RM095.

The GuardLogix system is a dual controller solution. You must use a primary controller and a safety partner to achieve SIL 3/PLe/Cat. 4.

Primary Controller	Safety Partner
1756-L61S, 1756-L62S, 1756-L63S	1756-LSP
1756-L71S, 1756-L72S, 1756-L73S	1756-L7SP
1756-L73SXT	1756-L7SPXT

During development, safety and standard have the same rules, multiple programmers, online editing, and forcing are all allowed. Once the project is tested and ready for final validation, you set the Safety Task to a SIL 3 integrity level, which is then enforced by the GuardLogix controller. When safety memory is locked and protected, the safety logic can't be modified and all safety functions operate with SIL 3 integrity. On the standard side of the GuardLogix controller, all functions operate like a regular Logix controller.

Use Guard I/O modules for field device connectivity on Ethernet or DeviceNet networks, and for safety interlocking between GuardLogix controllers use Ethernet or ControlNet networks. Multiple GuardLogix controllers can share safety data for zone to zone interlocking, or a single GuardLogix controller can use remote distributed safety I/O between different cells/areas.

In addition to the standard features of a ControlLogix controller, the GuardLogix controller has these safety-related features.

Feature	1756-L61S, 1756-L62S, 1756-L63S, 1756-LSP, 1756-L71S, 1756-L72S, 1756-L73S, 1756-L7SP, 1756-L73SXT, 1756-L7SPXT
Safety communication options	Standard and safety • EtherNet/IP • ControlNet • DeviceNet
Network connections, per network module	• 256 EtherNet/IP; 128 TCP (1756-EN2*x*, 1756-EN3*x*) • 128 EtherNet/IP; 64 TCP (1756-ENBT) • 128 ControlNet (1756-CN2/B, 1756-CN2R/B) • 64 DeviceNet (1756-DNB)
Controller redundancy	Not supported
Safety Task Programming languages	Relay ladder

Accessories—Controllers

Memory Cards

Memory cards offer nonvolatile memory to permanently store a user program and tag data on a controller. The ControlLogix L7 and GuardLogix L7 controllers ship with 1784-SD1 Secure Digital (SD) card already installed. The ControlLogix L6 and GuardLogix L6 controllers support optional CompactFlash cards that you purchase separately. The memory card installs in a socket on the controller. Through the Logix Designer application, you can manually trigger the controller to save to or load from nonvolatile memory or configure the controller to load from nonvolatile memory on powerup.

Attribute	1784-CF128	1784-SD1	1784-SD2
Memory	128 MB	1 GB	2 GB
Supported controllers	1756 ControlLogix L6 and 1756 GuardLogix L6	1756 ControlLogix L7 and 1756 GuardLogix L7	
Weight, approx.	14.2 g (0.5 oz)	1.76 g (0.062 oz)	

1756 Energy Storage Modules

Instead of a battery, the ControlLogix L7 and GuardLogix L7 controllers ship with a 1756-ESMCAP energy storage module (ESM) already installed.

Cat No.	Description
1756-ESMCAP	Capacitor-based ESM included with the controller.
1756-ESMNSE	ESM without WallClockTime back-up power. Additionally, you can use this ESM with a 1756-L73 (8 MB) or smaller memory-sized controller only. Use this ESM if your application requires that the installed ESM deplete its residual energy to 40 µJ or less before transporting it into or out of your application.
1756-ESMNRM	ESM that secures the controller by permanently preventing the USB connection and SD card use. This ESM provides your application an enhanced degree of security.

The ControlLogix-XT L7 extreme temperature controller ships with a 1756-ESMNCAPXT energy storage module installed.

Cat No.	Description
1756-ESMCAPXT	Capacitor-based ESM included with the controller.
1756-ESMNSEXT	ESM without WallClockTime back-up power. Additionally, you can use this ESM with a1756-L73XT (8 MB) or smaller memory-sized controller only. Use this ESM if your application requires that the installed ESM deplete its residual energy to 40 µJ or less before transporting it into or out of your application.
1756-ESMNRMXT	ESM that secures the controller by permanently preventing the USB connection and SD card use. This ESM provides your application an enhanced degree of security.

The 1756-L7SP safety partner for a GuardLogix system has the following modules available.

Cat No.	Description
1756-SPESMNSE	Capacitor-based ESM for a GuardLogix safety partner.
1756-SPESMNRM	ESM for a GuardLogix safety partner that secures the safety partner by permanently preventing the USB connection and SD card use.

1756 ControlLogix Batteries

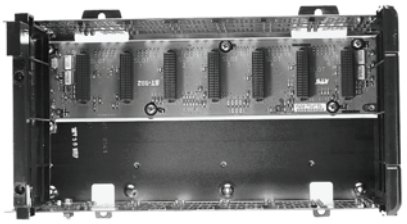
Each ControlLogix 1756-L6 and GuardLogix 1756-L6 controller ships with a battery. With a memory card installed, the controller can be used without a battery. If you do not use a battery, current tag data will be at the state it was when the memory card was saved.

Attribute	1756-BA1	1756-BA2	1756-BATM(1)	1756-BATA
Description	Lithium battery (0.59 g)	Lithium battery (0.59 g)	Externally mounted battery assembly	Replacement lithium battery for 1756-BATM (5 g max lithium per each D cell; contains 2 D cells)
ControlLogix controllers	1756-L61/A, 1756-L62/A, 1756-L63/A	1756-L61/B, 1756-L62/B, 1756-L63/B 1756-L64/B, 1756-L65/B	1756-L61/A, 1756-L62/A, 1756-L63/A	—
GuardLogix controllers	—	1756-L61S, 1756-L62S, 1756-L63S	—	—
ControlLogix-XT controllers	—	1756-L63XT	—	—

(1) The 1756-BATM externally mounted battery assembly is highly recommended for use with all series A, 1756 ControlLogix L6 controllers and provides longer battery life than the 1756-BA1 battery. The 1756-BATM includes one 1756-BATA lithium battery assembly and a 1 m (3.28 ft) cable to connect housing to controller.

ControlLogix Chassis

The ControlLogix system is a modular system that requires a 1756 I/O chassis. Place any module into any slot. The backplane provides a high-speed communication path between modules.



All of the chassis are designed for horizontal-only, back-panel mounting. The chassis are available in these configurations:

- Standard chassis
- ControlLogix-XT chassis

For detailed specifications, see the 1756 ControlLogix Chassis Specifications Technical Data, publication 1756-TD006.

Standard Chassis

The chassis backplane provides a high-speed communication path between modules and distributes power to each of the modules within the chassis.

Cat. No.	Description	Slots
1756-A4	Standard chassis	4
1756-A7		7
1756-A10		10
1756-A13		13
1756-A17		17

ControlLogix-XT Chassis

The ControlLogix-XT chassis support extreme temperature environments.

Cat. No.	Description	Slots	Temperature Range
1756-A4LXT	ControlLogix-XT chassis	4	-25…60 °C (-13…140 °F)
1756-A5XT		5	-25…70 °C (-13…158 °F)
1756-A7XT		7	-25…70 °C (-13…158 °F)
1756-A7LXT		7	-25…60 °C (-13…140 °F)

Accessories - Chassis

Use a slot filler module to fill empty slots.

Cat. No.	Description
1756-N2	Slot filler module for empty slots in standard ControlLogix chassis
1756-N2XT	Slot filler module for empty slots in ControlLogix-XT chassis

ControlLogix Power Supplies

ControlLogix power supplies are used with the 1756 chassis to provide 1.2V, 3.3V, 5V, and 24V DC power directly to the chassis backplane. Select from these configurations:

- Standard power supplies
- ControlLogix-XT power supplies
- Redundant power supplies

For detailed specifications, see the 1756 ControlLogix Power Supplies Specifications Technical Data, publication 1756-TD005.

Standard Power Supplies

You mount a standard power supply directly on the left end of the chassis, where it plugs directly into the backplane.

Cat. No.	Description	Voltage Category	Operating Voltage Range	Chassis
1756-PA72	Standard AC power supply	120V/220V AC	85…265V AC	Standard, series A and series B
1756-PA75		120V/220V AC	85…265V AC	Standard, series B
1756-PB72	Standard DC power supply	24V DC	18…32V DC	Standard, series A and series B
1756-PB75		24V DC	18…32V DC	Standard, series B
1756-PC75		48V DC	30…60V DC	Standard, series B
1756-PH75		125V DC	90…143V DC	Standard, series B

ControlLogix-XT Power Supplies

The ControlLogix-XT power supplies support extreme temperature environments.

Cat. No.	Description	Voltage Category	Operating Voltage Range	Chassis
1756-PAXT	ControlLogix-XT AC power supply	85…265V AC	120/240V AC	XT
1756-PBXT	ControlLogix-XT DC power supply	24V DC	18…32V DC	XT

Redundant Power Supplies

A redundant power supply system provides additional uptime protection for chassis used in critical applications. The redundant power supplies funnel power through the chassis adapter module to the ControlLogix Series B chassis backplane. To build a redundant power supply system you need the following components.

Cat. No.	Amount	Description	Voltage Category	Operating Voltage Range	Chassis
1756-PAR2	Kit	Bundled system contains: – Two1756-PA75R power supplies – Two 1756-CPR2 cables – One 1756-PSCA2 chassis adapter module	110V AC	N/A	Standard, series B
1756-PBR2	Kit	Bundled system contains: – Two 1756-PB75R power supples – Two 1756-CPR2 cables – One 1756-PSCA2 chassis adapter module	24V DC	N/A	
1756-PA75R/A or 1756-PB75R/A	2	Redundant AC power supply Redundant DC power supply	120V/220V AC 24V DC	85…256V AC 19.2…32V DC	
1756-CPR2	2	Redundant power supply cable (Length = 0.91 m [3 ft])	N/A	N/A	
1756-PSCA2	1	Redundant power supply chassis adapter module			
N/A (user-supplied)	2	Annunciator wiring(1) (Maximum length = 10 m [32.8 ft])			

(1) Optional user-supplied annunciator wiring can be connected to the solid state relay for status and troubleshooting purposes.

Visualization Products

Visualization products, together with Logix for control and NetLinx architecture for communication, make up the Rockwell Automation Integrated Architecture™ strategy. The visualization strategy combines Rockwell Automation expertise in Allen-Bradley® electronic operator interface and industrialized personal computer hardware with Rockwell Software® supervisory control software. Current visualization products include the following:

- FactoryTalk View software
- PanelView Plus operator interface
- PanelView Plus CE operator interface
- Industrial computers and monitors

For more information, see the Operator Interface catalog pages at http://www.ab.com/en/epub/catalogs/12762/2181376/1239781/.

Programming Software

Your selection of modules and network configuration determines what software packages you need to configure and program your system.

Studio 5000 Environment

The Studio 5000™ Engineering and Design Environment combines engineering and design elements into a common environment. The first element in the Studio 5000 environment is the Logix Designer application. The Logix Designer application is the rebranding of RSLogix™ 5000 software and will continue to be the product to program Logix5000™ controllers for discrete, process, batch, motion, safety, and drive-based solutions.

The Studio 5000 environment is the foundation for the future of Rockwell Automation® engineering design tools and capabilities. It is the one place for design engineers to develop all the elements of their control system.

1756 System Software

If you have	You need	Order
1756 ControlLogix controller 1756 SERCOS or analog motion module	Studio 5000 Logix Designer application	9324 series [1]
1756-CN2, 1756-CN2R 1756-CN2RXT 1756-CNB, 1756-CNBR ControlNet communication module	RSNetWorx™ for ControlNet software	9324 series[1] (RSNetWorx option) or 9357-CNETL3 (RSNetWorx for ControlNet)
1756-DNB DeviceNet communication module	RSNetWorx for DeviceNet software	9324 series[1] (RSNetWorx option) or 9357-DNETL3 (RSNetWorx for DeviceNet)
1756-EN2F, 1756-EN2T 1756-EN2TX 1756-EN2TR, 1756-EN3TR 1756-ENBT, 1756-EWEB EtherNet/IP communication module (set the IP address)	RSLinx software or BOOTP/DHCP server utility to set IP addresses Optional RSNetWorx for EtherNet/IP software	9324 series[1] Optional 9357-ENETL3 (RSNetWorx for EtherNet/IP)
1756-DHRIO, 1756-DHRIOXT communication module 1756-DH485 communication module	RSLinx software	9324 series[1]
1757-FFLD2, 1757-FFLD4 1757-FFLDC2, 1757-FFLDC4 Foundation Fieldbus linking device	RSFieldbus configuration software	9308 series
Communication card in a workstation	RSLinx software	9324 series[1]

(1) All 9324 packages include RSLinx Classic Light.

Studio 5000 Logix Designer Application

To use the Logix Designer application effectively, your personal computer must meet the following hardware and software requirements for the Studio 5000 environment, version 21.00.00.

Hardware Requirements

The personal computer must meet these minimum requirements. Using a computer meeting or exceeding the recommended characteristics will improve performance.

Characteristic	Minimum	Recommended
Processor	Pentium 4	Intel Core i5
Speed	2.8 GHz	2.4 GHz
RAM memory	1 GB	8 GB
Hard disk space	16 GB free	20 GB free
Graphics device	1024x768, true color	DirectX 9, with WDDM 1.0 or higher driver

Software Requirements

Operating system and service pack compatibility is as follows:

- This version of Logix Designer has been tested on the following operating systems:
  - Microsoft Windows 7 Professional (64-bit) with Service Pack 1
  - Microsoft Windows 7 Home Premium (64-bit) with Service Pack 1
  - Microsoft Windows 7 Home Premium (32-bit) with Service Pack 1
  - Microsoft Windows Server 2008 R2 Standard Edition with Service Pack 1
- This version of the Logix Designer application has not been tested but is expected to operate correctly on all other editions and service packs of the following operating systems:
  - Microsoft Windows 7
  - Microsoft Windows Server 2008 R2
- For operating systems that support User Account Control (UAC), this version of the Logix Designer application was tested with UAC set to the most restrictive level ("Always notify" for Windows 7). This version of the Logix Designer application is also expected to operate correctly when UAC is configured for any less restrictive setting.
- Running the Logix Designer application in conjunction with Fast-User Switching, in Safe mode, or via Remote Desktop is not supported.

Additional Software Product Considerations

Additional software compatibility is as follows:

- FactoryTalk Services Platform, version 2.51 or later is not required to run the Logix Designer application; however, it is required in order to perform some security functions in the Logix Designer application.
- RSLinx Classic communication software is not required to install the Logix Designer application; however, it is required in order to perform online communication with controllers.
- RSLinx Classic version 3.51.00 is a component aligned to Logix Designer, version 21.00.00. RSLinx Classic, version 3.51.00 (CPR9 Service Release 5.1) has been tested, and is compatible, with the following products:
  - FactoryTalk Services Platform, version 2.51.00
  - RSLinx Enterprise, version 5.51.00
  - RSNetWorx software, version 21.00.00
  - FactoryTalk Activation Manager, version 3.51.00
- RSLinx Classic, version 3.51.00, Logix Designer application, version 21.00.00, and device profiles that ship with the Logix Designer application, version 21.00.00 are not compatible with these products:
  - RSNetWorx software, version 11.00.00 or earlier
  - DeviceNet Tag Generator, version 11.0.20.0

  RSNetWorx software and the DeviceNet Tag Generator must be upgraded prior to installing these products.
- FactoryTalk View SE (CPR 9) software and RSLinx Enterprise communication software are not required to install the Logix Designer application; however, these products are required to fully use the alarm capabilities introduced with version 16.03.00.
- Be sure to check the software requirements for other Rockwell Software products that you intend to install to be sure that these products are also compatible with the system.

PanelView™ Plus 6
700, 1000, 1250, and 1500 Terminals

Machine-level HMI

Features and Benefits

Application Performance
PanelView Plus 6 provides an additional competitive edge for end users and OEMs by enabling increased machine performance. Expanded memory allows for greater flexibility in applications, while increased processor speed provides the operator a better experience through faster terminal response and greater control. Both enhancements improve visibility to data and provide a platform to make better, faster decisions.

Development Enhancements
Machine builders and end-users are under constant pressure to reduce design time, increase flexibility and deliver more value – exactly what FactoryTalk View Machine Edition 6.0 and Rockwell Automation's Integrated Architecture deliver. Rockwell Automation simplifies users' enterprise-wide process visualization by using a single design environment, providing a platform to share information – even at the design stage. These tools also offer a jump start to your application development, while supplying troubleshooting tools to assist in commissioning.

Application flexibility sometimes means being able to leverage 3rd party add-ons. With PanelView Plus 6 you can do just that - further simplifying your overall machine development.

Take time and cost out of development while delivering more performance to operators and value to customers.

PanelView Plus 6 Description

Over the years Rockwell Automation has earned a reputation for offering a wide range of scalable visualization solutions, available in multiple configurations and sizes. PanelView Plus is one of the most versatile operator interface options within that suite of visualization solutions. Now Rockwell Automation is enhancing this product line by adding more power and features like expanded memory, a faster processor and Microsoft Windows CE 6 operating system.

New PanelView Plus 6 operator terminals are ideal for applications that require monitoring, controlling and displaying information in dynamic ways, where operators must quickly understand machine status and make better decisions.

Coupled with the latest, built-in FactoryTalk® View Machine Edition 6.0 and View Studio application development software, this solution extends the performance and functionality of machine-level operator interface, while retaining a common development environment and Integrated Architecture from Rockwell Automation.

PanelView Plus 6 terminals are available in a variety of modular display sizes, enabling you to select exactly what is required for your application. This provides a standard base of modules and customizable features to use across multiple applications, reducing maintenance and inventory costs.

To meet more stringent environmental conditions; high-bright, conformal-coated and marine certified displays modules are also available.

Performance To Meet Your Needs

Microsoft CE 6 operating system
Similar to the original PanelView Plus family, CE 6 delivers added security and reduced corruption in a closed system which doesn't require a shut down procedure. In addition, this operating system allows for more demanding applications – with virtually no limitations on the PanelView screens necessary to support complex applications.

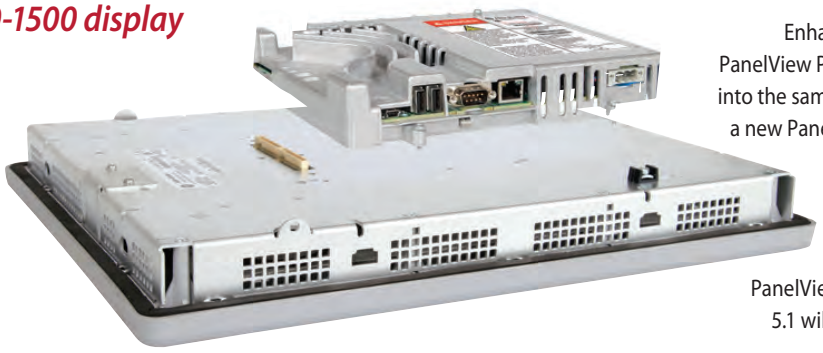
Increased memory
In addition to the operating system enhancements, a memory increase from 64MB to 512 MB supports graphic enhancements along with larger application runtime files – dramatically expanding the terminals' capacity to handle demanding graphic-intensive, memory-consuming applications.

Rugged hardware
The modular design allows for easy upgrades and flexible parts replacement. SD memory provides a rugged solid state memory. These features provide the kind of robust performance that can improve uptime.

Faster processor
An increase from 650MHz to 1 GHz enables operators to get to the screens and data they need faster, avoiding errors improving their ability to respond.

Ethernet/IP
One standard network for everyone – reducing overall machine cost and providing a platform for the future.

PanelView Plus 6 logic modules can connect with existing PanelView Plus 700-1500 display



Protecting Your Investment

Enhance your machine by migrating your PanelView Standard to a PanelView Plus 6 – no need for a new enclosure, a PanelView Plus 6 can fit into the same cutout. If you are already using a PanelView Plus (700-1500), a new PanelView Plus 6 logic module will fit right on the existing display, providing an easy way to increase performance. FactoryTalk View ME 6.0 further supports your migration process by allowing you to import your PanelView Standard application and convert it automatically to PanelView Plus 6*. PanelView Plus applications developed on FactoryTalk ME 4.0, 5.0, and 5.1 will automatically port for ME 6.0**, helping you to manage your investment and increase performance.

*Some PanelView Standard applications may require minor modifications after conversion.
**Applications using ActiveX will need to be re-compiled to run on PanelView Plus 6.

Application Development Enhancements

Single tag database
When your controller and operator interface use the same tag database, you reduce your development, commissioning and troubleshooting time.

Tools to simplify development
Faceplates and add-on instructions (AOIs) provide a jump start to your application as well as reduce commissioning and troubleshooting time.

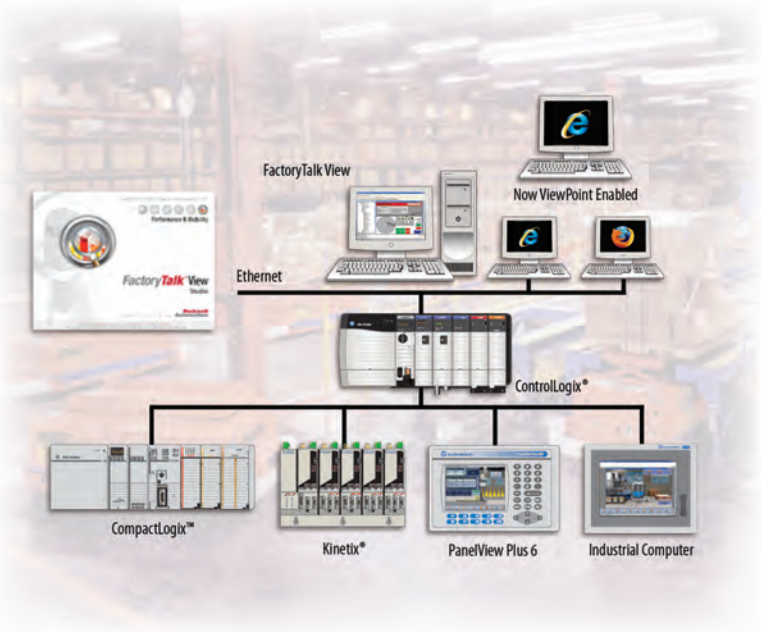
Enhanced graphics
Expanded vector-graphic symbol library enables you to create operator interfaces that more closely resemble your machines, providing operators with more intuitive, accurate graphics – helping them identify what is happening on the machine.

Global design and support
Design your machine for a worldwide market by supporting remote access using included ViewPoint software. ViewPoint enables secure access to a PanelView on a remote machine, with a web-browser. The included MS Arial Unicode font support means you can support up to 20 languages in a single runtime application, simplifying machine deployment around the world.

3rd party applications for your dedicated terminal
Microsoft CE 6 can be used to customize your applications with extended functionality to meet unique needs. This password protected feature can allow for applications such as terminal services, virtual network computing (VNC), video, Microsoft Office document viewers and many other applications. A built-in pdf viewer allows you to provide context-sensitive documentation that operators can access directly from application screens.

FactoryTalk View Advantage

FactoryTalk View is a comprehensive visualization solution designed with a common look and feel, and navigation to help speed HMI application development and training time. Supporting the Rockwell Automation Integrated Architecture, FactoryTalk View is part of the scalable and unified suite of monitoring and control solutions designed to span stand-alone machine-level applications up through supervisory-level HMI applications across a network. This suite offers you a application reuse, and architecture so you can increase productivity, reduce operation costs, and improve production quality.



	PanelView Plus 6 700	PanelView Plus 6 1000	PanelView Plus 6 1250	PanelView Plus 6 1500
Display Size	132 x 99 mm 640 x 480 resolution	211 x 158 mm 640 x 480 resolution	246 x 184 mm 800 x 600 resolution	304 x 228 mm 1024 x 768 resolution
Display Type	Color Active Matrix (TFT 18-bit color)			
Operating System	Microsoft Windows CE 6.0 R3			
Open Architecture	Yes (SDK available)			
CPU	x86 - 1.0 GHz			
RAM	512 MiB DDR2-533 (chip-on-board) (4264MiB/s peak)			
Internal Storage	512 MB			
Real-time clock	Yes, Battery-backed time clock timestamps critical data. Accuracy +/-2 minutes per month			
Environmental Operating Temperature	0 - 55°C (32 - 131°F)			
Ratings	NEMA 12, 13, 4X, IP54, IP65			
Certifications	cUL certified; UL listed; Class I, Div 2, Groups A,B,C,D; Class II, Div 2, Groups F, G, Class III, T4, Class I Zone 2 Group IIC			
Interfaces				
SD	1 x SDHC			
USB	2 x USB-A (v2.0 high speed), 1 x Mini-USB-B (v2.0 high speed 5 pin)			
PCI	1 x PCI (3.3/5V 32-bit)			
Communication Interfaces				
Ethernet	1 x RJ45 10/100 Mb Auto-MDI/MDI-X			
Ethernet (2nd NIC)	Available via add-on module			
RS232	1 x DB9			
ControlNet	Available via add-on module			
Data Highway Plus	Available via add-on module			
DH485	Available via add-on module			
Input Power	18-30V DC (isolated) or 85-264V AC @ 47-63 Hz			
Standard Software	FactoryTalk Machine Edition, FactoryTalk Viewpoint, PDF viewer, ActiveX controls, remote terminal control, FTP server			
Extended Software Option	Windows Media Player, Internet Explorer, Microsoft Office viewers			

www.rockwellautomation.com

Power, Control and Information Solutions Headquarters

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444
Europe/Middle East/Africa: Rockwell Automation, Vorstlaan/Boulevard du Souverain 36, 1170 Brussels, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640
Asia Pacific: Rockwell Automation, Level 14, Core F, Cyberport 3, 100 Cyberport Road, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846

Publication 2711P-PP010B - February 2013
Supersedes Publication 2711P-PP010A - October 2010

User Manual

Allen-Bradley

PanelView Plus 6 HMI Terminals

700, 1000, 1250, 1500

Catalog Numbers 2711P-K7C4D8, 2711P-T7C4D8, 2711P-T7C4D8K, 2711P-B7C4D8, 2711P-K7C4A8, 2711P-T7C4A8, 2711P-B7C4A8, 2711P-K10C4D8, 2711P-T10C4D8, 2711P-B10C4D8, 2711P-K10C4A8, 2711P-T10C4A8, 2711P-B10C4A8, 2711P-K12C4D8, 2711P-T12C4D8, 2711P-T12C4D8K, 2711P-B12C4D8, 2711P-K12C4A8, 2711P-T12C4A8, 2711P-B12C4A8, 2711P-K715C4D8, 2711P-T15C4D8, 2711P-B15C4D8, 2711P-K15C4A8, 2711P-T15C4A8, 2711P-B15C4A8, 2711P-K7C4D9, 2711P-T7C4D9, 2711P-B7C4D9, 2711P-K7C4A9, 2711P-T7C4A9, 2711P-B7C4A9, 2711P-K10C4D9, 2711P-T10C4D9, 2711P-B10C4D9, 2711P-K10C4A9, 2711P-T10C4A9, 2711P-B10C4A9, 2711P-K12C4D9, 2711P-T12C4D9, 2711P-B12C4D9, 2711P-K12C4A9, 2711P-T12C4A9, 2711P-B12C4A9, 2711P-K15C4D9, 2711P-T15C4D9, 2711P-B15C4D9, 2711P-K15C4A9, 2711P-T15C4A9, 2711P-B15C4A9

Allen-Bradley • Rockwell Software

Rockwell Automation

Important User Information

Solid-state equipment has operational characteristics differing from those of electromechanical equipment. Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls (publication SGI-1.1 available from your local Rockwell Automation sales office or online at http://www.rockwellautomation.com/literature/) describes some important differences between solid-state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid-state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

No patent liability is assumed by Rockwell Automation, Inc. with respect to use of information, circuits, equipment, or software described in this manual.

Reproduction of the contents of this manual, in whole or in part, without written permission of Rockwell Automation, Inc., is prohibited.

Throughout this manual, when necessary, we use notes to make you aware of safety considerations.

	**WARNING:** Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.
	**ATTENTION:** Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence.
	**SHOCK HAZARD:** Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.
	**BURN HAZARD:** Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.

This manual contains new and updated information. Changes throughout this revision are marked by change bars, as shown to the right of this paragraph.

New and Updated Information

This table contains the changes made to this revision.

Topic	Page
Logic modules now have marine certification.	16, 22
Restart system command added to Start menu.	41
New software input panels added to Windows CE operating system.	86
New VNC viewer available to establish a VNC connection between two PanelView Plus 6 terminals.	86
New Backup and Restore application in control panel.	88, 89
Keyboard, Keypad, or Touch applications appear in control panel only if input device is detected on HMI terminal.	94
Custom desktop backgrounds and images on the Background and Appearance tabs of the Display Properties dialog box.	88, 95
Enabling Display Cursor moved to Advance tab of Display Properties dialog box.	96
Rotation feature added to Advance tab of Display Properties dialog box.	88, 97
New Logo Manager application in the control panel.	88, 98
System Information in the control panel has been updated with these new startup options: • Visual style of button controls • Safe mode boot option • Advanced diagnostics	99…101
New User Account application in control panel.	88, 102
New Server Configuration application in control panel with tabs for configuring VNC, FTP, Web, KEPServer communication, and file servers.	88, 104…112
New image viewer available from the Start menu.	117
The file names for firmware upgrades have changed.	152
Restore codes added to start-up messages and codes.	162
Using Program Launcher ActiveX control to launch application viewers	166
Restore factory defaults procedure	171

Chapter 4

Configuration Mode

Chapter 5

Windows CE Operating System

Chapter 6

Install and Replace Components

Chapter 7

Terminal Connections

This manual describes how to install, configure, operate, and troubleshoot PanelView™ Plus 6 Terminals. It does not provide procedures on how to create applications that run on the terminals.

Intended Audience

Use this manual if you are responsible for installing, operating, or troubleshooting the PanelView Plus 6 terminals. This manual does not give procedures for creating applications that run on terminals.

Equipment installers must be familiar with standard panel installation techniques.

Additional Resources

These documents contain additional information concerning related products from Rockwell Automation.

Resource	Description
Visualization Solutions Selection Guide, publication View-SG001	Provides an overview and selection guidelines for the available visualization platforms including the PanelView Plus 6 platform.
PanelView Plus Specifications Technical Data, publication 2711P-TD005	Provides technical specifications, environmental specifications, and certifications for the PanelView Plus 6 platform.
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation® industrial system.
Product Certifications website, http://www.ab.com	Provides declarations of conformity, certificates, and other certification details.

You can view or download publications at http://www.rockwellautomation.com/literature/. To order paper copies of technical documentation, contact your local Allen-Bradley® distributor or Rockwell Automation sales representative.

Firmware Upgrades

For the latest firmware upgrades and other downloads for your PanelView Plus 6 terminal, go to http://www.rockwellautomation.com/support and select Firmware Updates under Downloads.

Notes:

Overview

About the Terminals

PanelView Plus 6 terminals are operator interface devices that run HMI machine-level applications in an industrial environment. They are used to monitor, control, or display information graphically, allowing operators to quickly understand the status of their application.

This platform is programmed using common development software providing multi-language support, and integrates into systems with Rockwell Automation controllers including the preferred Logix controllers.

Modular components are usable across the entire PanelView Plus 6 platform:

- Display modules range in size from 6.5 to 15-inches with either key, touch, or combination key/touch input
- Windows CE logic module runs an open or closed desktop environment and offers optional, extended features and file viewers
- Optional communication modules for network communication

Windows CE Operating System

All PanelView Plus 6 terminals run the Windows CE operating system (OS), providing the foundational OS elements for the majority of user needs.

For users with more complex application requirements, PanelView Plus 6 terminals are available with optional, extended features, and file viewers.

Table 1 - Operating System Features

Standard Features	Cat. No. 2711P-*xxxx*8 2711P-RP8*x*	Cat. No. 2711P-*xxxx*9 2711P-RP9*x*
FTP server	•	•
VNC client/server	•	•
ActiveX controls(1)	•	•
Third-party device support	•	•
PDF reader	•	•
Optional Extended Features		
Web browser - Internet Explorer	—	•
Remote desktop connection	—	•
Media player	—	•
Microsoft Office file viewers		
• PowerPoint	—	•
• Excel	—	•
• Word	—	•
WordPad text editor	—	•

(1) Refer to Display FactoryTalk View ME Station Information on page 77 for a complete list of ActiveX controls loaded on each terminal.

Open Versus Closed System

All PanelView Plus 6 terminals can be configured to run an open or closed desktop environment:

- An open system launches the Windows Explorer shell on startup and appears with the Windows CE desktop and control panel. The system is configurable via the control panel and supports Windows operations.
- A closed system launches a FactoryTalk® View Machine Edition application on startup and does not allow access to the Windows CE desktop.

All terminals are initially shipped as closed systems restricting access to the desktop. The first time you start the system, the terminal launches FactoryTalk View ME Station Configuration mode. At this point, you can change the start-up option and allow desktop access.

Startup Options

You can configure your terminal to perform one of three actions at startup:

- Launch a FactoryTalk View Machine Edition HMI application
- Launch the FactoryTalk View Machine Edition Configuration mode of the terminal where you load and run applications, configure startup options and terminal settings, and enable or disable desktop access.
- Launch the Windows Explorer desktop shell. The system is configurable via the control panel and supports Windows operations.

The factory default state and the startup option following a firmware upgrade is to launch the FactoryTalk View ME Station Configuration mode of the terminal. Refer to Startup Options on page 49 for information on how to change the startup option.

Desktop Access

Any of the terminals can be configured to allow or restrict desktop access. From the desktop, you can perform system and control panel operations, or run third-party applications. Terminals with optional, extended features can additionally run viewers, media players, and launch the web browser. You can even allow access temporarily to perform specific tasks, then disable desktop access to prevent unauthorized changes.

TIP All terminals are initially shipped with desktop access disabled.

Refer to Desktop Access on page 52 for details on how to modify desktop access.

IMPORTANT Allowing desktop access does not change the feature set of your terminal. For example, If you have a PanelView Plus 6 terminal without extended features, opening the desktop will not give you access to them.

Software Support

All PanelView Plus 6 terminals support the same HMI software.

Table 2 - PanelView Plus 6 Software Support

Software	Description	Version
FactoryTalk Machine Edition Station	Runtime environment for FactoryTalk View Machine Edition .mer applications. Machine Edition Station is preloaded on each PanelView Plus 6 terminal and does not require FactoryTalk View activation.	6.0 or later
FactoryTalk View Studio for Machine Edition	Configuration software for developing and testing HMI applications that run on PanelView Plus 6 terminals preloaded with FactoryTalk View Machine Edition Station.	6.0 or later
FactoryTalk ViewPoint	Add-on capability provided with FactoryTalk View Studio software. • This web-based, thin-client solution allows manufacturers or casual users to monitor or download changes to a running Machine Edition application from remote locations via an Internet browser. • A single license is embedded with each PanelView Plus 6 terminal supporting a single client connection to terminal. No additional software is required.	1.2 or later
Windows CE 6.0 operating system	All PanelView Plus 6 terminals and logic modules support the Windows CE 6.0 operating system with or without optional, extended features.	6.0 R3

Modular Components

The terminals consist of three modular components: display module, logic module, and optional communication module. These components allow for flexible configuration, installation, and upgrades. You can order a factory-assembled unit with a single catalog number or separate components for field installation.

Figure 1 - Modular Components

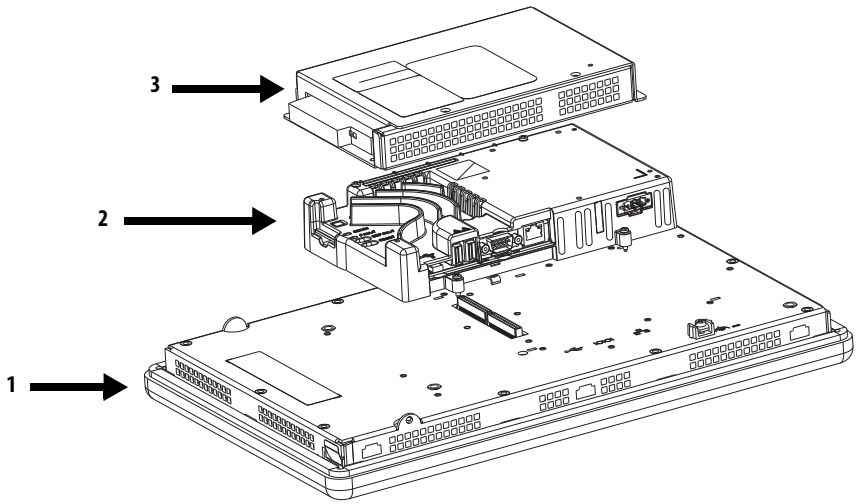


Table 3 - Modular Component Descriptions

Item	Terminal Component	Description	Options for Environmental Conditions
1	Display module	Flat panel, color graphic display in four sizes with keypad, touch-screen, or combination keypad/touch-screen input. • 700 (6.5 in.) • 1000 (10.4 in.) • 1250 (12.1 in.) • 1500 (15 in.)	Display modules are also available with these characteristics. • Marine-certified • Conformal-coated • High-bright display for outdoor use • Built-in antiglare overlay
2	Logic module	The logic modules has these hardware features. • Power input, AC or DC • RS-232 serial port • Ethernet port • 2 USB 2.0 host ports, 1 high-speed device port • Network interface for optional communication module • 512 MB nonvolatile flash and 512 MB RAM • Secure Digital (SD) card slot • Battery-backed real-time clock • Status indicators • Reset switches • Single PCI slot	Logic modules are also available with these characteristics. • Marine-certified • Conformal-coated
3	Communication module	Optional module for communication with these networks. • DH+™/DH-485 • ControlNet scheduled and unscheduled	Communication modules are also available with these characteristics. • Marine-certified • Conformal-coated

Configured Terminals

A configured terminal, ordered as a single-catalog number, has a display module and logic module.

An optional DH+/DH-485 or ControlNet communication module can be added later for additional network capabilities.

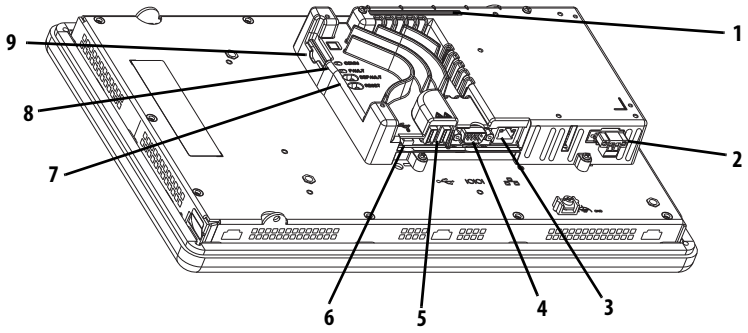


Table 4 - Logic Module Features

Item	Feature
1	Network interface connector for optional communication module
2	AC or DC power input(1) • Isolated 18…32V DC • 85…264V AC
3	10/100 BaseT, Auto MDI/MDI-X, Ethernet port for logic controller communication
4	Serial RS-232 port for file transfers, printing, and logic controller communication
5	2 USB host ports for attaching USB devices including mouse, keyboard, printer, and flash drives that are hot-swappable in nonhazardous locations
6	1 USB device port for connecting a host personal computer
7	Reset switches
8	Status indicators
9	Secure Digital (SD) card slot that is hot-swappable and supports cat. no. 1784-SD*x* SD cards.

(1) For DC applications using AC power, an external, remote AC-to-DC power supply, cat. no. 2711P-RSACDIN, is available for DIN-rail mounting.

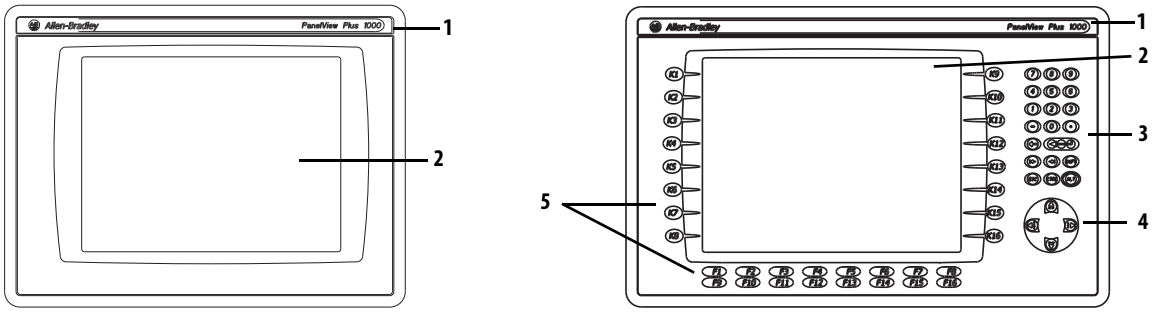
Display Modules

All 700 to 1500 display modules have TFT color, graphic displays with either keypad, touch screen, or combination keypad/touch-screen input. Common features and firmware provide for easy migration to a larger display:

- Eight-wire resistive touch screens are extremely accurate for operator interfaces. When a point on the touch screen is pressed, the layers connect and change the electrical current, which is then registered and processed.
- All keypad or combination keypad/touch-screen displays are similar except for the number of functions keys.

To meet the requirements of specific environmental conditions, high-bright displays, marine-certified displays, and conformal-coated displays are also available. Plus, you can order field replaceable bezels.

Figure 2 - Display Modules



IMPORTANT The keypad is designed for finger or gloved finger operation. The touch screen may be operated with a finger, gloved finger, or plastic stylus device with a minimum tip radius of 1.3 mm (0.051 in.). Using any other object or tool may damage the keypad or touch screen.

Table 5 - Display Features

Item	Feature	Description
1	Replaceable ID Label	Allen-Bradley label that can be replaced with custom label.
2	Display	Analog resistive touch screen applies to touch-screen or combination keypad/touch-screen terminals.
3	Numeric keypad	0…9, –, Backspace, Enter, Left and Right tab, Shift, Esc, Ctrl, Alt keys.
4	Navigation keys	Use the arrow keys to move the cursor in lists and select objects. Alt+arrow key activates home, end, page up, and page down functions.
5	Function keys 700 F1 …F10, K1…K12 1000 F1 …F16, K1…K16 1250 F1 …F20, K1…K20 1500 F1 …F20, K1…K20	Keys that initiate functions on the terminal display. Replaceable legends are available to customize the function key labels.

Catalog Number Explanation

This is the catalog number explanation for configured units of the PanelView Plus 6 terminals.

	Input Type	Display Size	Display Type	Communication (1)	Power	Operating System	Special Option
2711P-	**K** = Keypad	**7** = 6.5 in.	**C** = Color	**4** = Ethernet, RS-232 & (2) USB	**A** = AC	**8**= Windows CE 6.0 operating system	**K** = Conformal-Coated
	T = Touch	**10** = 10.4 in.			**D** = DC	**9** = Windows CE 6.0 operating system with extended features	
	B = Keypad/Touch	**12** = 12.1 in.					
		15 = 15 in.					

(1) Optional communication modules are available as separate catalog numbers.

Terminal Selections

The PanelView Plus 6 configured terminals have logic modules with or without extended features and file viewers. Communication modules are ordered as separate catalog numbers.

Table 6 - PanelView Plus 6 Terminals

Cat. Nos.			Display		Communication		Input Power	Memory RAM/Nonvolatile(2)
Keypad	Touch	Keypad/Touch	Size	Type	RS-232	Ethernet		
700 Model								
2711P-K7C4D8	2711P-T7C4D8	2711P-B7C4D8	6.5-in.	Color	•	•	DC	512 MB/512 MB
–	2711P-T7C4D8K(1)	–			•	•	DC	512 MB/512 MB
2711P-K7C4A8	2711P-T7C4A8	2711P-B7C4A8			•	•	AC	512 MB/512 MB
1000 Model								
2711P-K10C4D8	2711P-T10C4D8	2711P-B10C4D8	10.4-in	Color	•	•	DC	512 MB/512 MB
2711P-K10C4A8	2711P-T10C4A8	2711P-B10C4A8			•	•	AC	512 MB/512 MB
1250 Model								
2711P-K12C4D8	2711P-T12C4D8	2711P-B12C4D8	12.1-in	Color	•	•	DC	512 MB/512 MB
–	2711P-T12C4D8K(1)	–			•	•	DC	512 MB/512 MB
2711P-K12C4A8	2711P-T12C4A8	2711P-B12C4A8			•	•	AC	512 MB/512 MB
1500 Model								
2711P-K15C4D8	2711P-T15C4D8	2711P-B15C4D8	15-in.	Color	•	•	DC	512 MB/512 MB
2711P-K15C4A8	2711P-T15C4A8	2711P-B15C4A8			•	•	AC	512 MB/512 MB

(1) Conformal-coated terminal.

(2) The logic module supports FactoryTalk View Machine Edition software, version 6.0 or later, FactoryTalk ViewPoint software version 1.2 or later, and the Windows CE 6.0 operating system.

Table 7 - PanelView Plus 6 Terminals with Extended Features

Cat. Nos.			Display		Communication		Input Power	Memory RAM/Nonvolatile[1]
Keypad	**Touch**	**Keypad/Touch**	**Size**	**Type**	**RS-232**	**Ethernet**		
700 Model								
2711P-K7C4D9	2711P-T7C4D9	2711P-B7C4D9	6.5-in.	Color	•	•	DC	512 MB/512 MB
2711P-K7C4A9	2711P-T7C4A9	2711P-B7C4A9			•	•	AC	512 MB/512 MB
1000 Model								
2711P-K10C4D9	2711P-T10C4D9	2711P-B10C4D9	10.4-in	Color	•	•	DC	512 MB/512 MB
2711P-K10C4A9	2711P-T10C4A9	2711P-B10C4A9			•	•	AC	512 MB/512 MB
1250 Model								
2711P-K12C4D9	2711P-T12C4D9	2711P-B12C4D9	12.1-in	Color	•	•	DC	512 MB/512 MB
2711P-K12C4A9	2711P-T12C4A9	2711P-B12C4A9			•	•	AC	512 MB/512 MB
1500 Model								
2711P-K15C4D9	2711P-T15C4D9	2711P-B15C4D9	15-in.	Color	•	•	DC	512 MB/512 MB
2711P-K15C4A9	2711P-T15C4A9	2711P-B15C4A9			•	•	AC	512 MB/512 MB

(1) The logic module supports FactoryTalk View Machine Edition software, version 6.0 or later, FactoryTalk ViewPoint software version 1.2 or later, and the Windows CE 6.0 operating system with extended features and file viewers.

Module Selections

Display modules, logic modules, and communication modules can be ordered as separate components for field installation.

Table 8 - Display Modules

Cat. No.	Input Type	Display	Marine Certified	Conformal Coated	Built-in Antiglare Overlay
700 Model					
2711P-RDK7C	Keypad	7-in. color			
2711P-RDK7CK	Keypad			•	
2711P-RDT7C	Touch				
2711P-RDT7CK	Touch			•	
2711P-RDT7CM	Touch		•		
2711P-RDB7C	Keypad/Touch				
2711P-RDB7CK	Keypad/Touch			•	
2711P-RDB7CM	Keypad/Touch		•		
1000 Model					
2711P-RDK10C	Keypad	10-4 in. color			
2711P-RDT10C	Touch				
2711P-RDT10CM	Touch		•		
2711P-RDB10C	Keypad/Touch				
2711P-RDB10CM	Keypad/Touch		•		
1250 Model					
2711P-RDK12C	Keypad	12.1-in. color			
2711P-RDK12CK	Keypad			•	
2711P-RDT12C	Touch				
2711P-RDT12CK	Touch			•	
2711P-RDT12H(1)	Keypad/Touch				
2711P-RDT12AG	Touch				•
2711P-RDB12C	Keypad/Touch				
2711P-RDB12CK	Keypad/Touch			•	
1500 Model					
2711P-RDK15C	Keypad	15-in. color			
2711P-RDT15C	Touch				
2711P-RDT15AG	Touch				•
2711P-RDB15C	Keypad/Touch				

(1) H at end of cat. no. refers to 1250 High-bright display module.

Table 9 - Logic Modules

Cat. No.	Power Input	Memory RAM/Nonvolatile	Communication	Marine Certified	Conformal Coated	Included Software
Without Extended Features						
2711P-RP8A	AC	512 MB/512 MB	• Ethernet • RS-232 • Network interface for communication module	•		• Windows CE 6.0 operating system • FactoryTalk View Machine Edition runtime, version 6.0 or later • FactoryTalk ViewPoint software, version 1.2 or later
2711P-RP8D	DC	512 MB/512 MB		•		
2711P-RP8DK	DC	512 MB/512 MB		•	•	
With Extended Features						
2711P-RP9A	AC	512 MB/512 MB	• Ethernet • RS-232 • Network interface communication module	•		• Windows CE 6.0 operating system with extended features and file viewers • FactoryTalk View Machine Edition runtime, version 6.0 or later • FactoryTalk ViewPoint software, version 1.2 or later
2711P-RP9D	DC	512 MB/512 MB		•		
2711P-RP9DK	DC	512 MB/512 MB		•	•	

Table 10 - Communication Modules

Cat. No	Communication			Conformal Coated	Marine Certified
	DH+	DH-485	ControlNet (1)		
2711P-RN6	•	•			
2711P-RN6K	•	•		•	
2711P-RN15S			•		•
2711P-RN15SK			•	•	

(1) Scheduled and unscheduled communication.

Accessories

Tables 11...19 list accessories for the PanelView Plus 6 terminals.

Table 11 - Secure Digital (SD) Cards

Cat. No.	Description
1784-SD1	1 GB Secure Digital (SD) card
1784-SD2	2 GB Secure Digital (SD) card
2711C-RCSD	USB to SD adapter for secure digital card (SD)

Table 12 - Backlight Replacements

Cat. No.	Terminal Model	Series	Number of Backlights
2711P-RL7C	700	A and B	1
2711P-RL7C2		C and D	1
2711P-RL10C	1000	A	1
2711P-RL10C2		B and C	1
2711P-RL12C	1250	A and B	2
2711P-RL12C2		C	1
2711P-RL15C	1500	B	2

Table 13 - Antiglare Overlays

Cat. No.(1)	Terminal Model	Operator Input		
		Keypad	Touch	Key/Touch
2711P-RGK7	700	•		•
2711P-RGT7			•	
2711P-RGK10	1000	•		•
2711P-RGT10			•	
2711P-RGK12	1250	•		•
2711P-RGT12			•	
2711P-RGK15	1500	•		•
2711P-RGT15			•	

(1) Three overlays are shipped with each catalog number.

Table 14 - Solar Visor

Cat. No.	Description
2711P-RVT12	Solar visor for 1250 high-bright display module, cat. no. 2711P-RDT12H

Table 15 - Mounting Hardware

Cat. No.	Description	Quantity
2711P-RTMC	Mounting clips	8

Table 16 - Programming Cable

Cat. No.	Description	Length
2711C-CBL-UU02	USB host to USB device programming cable	2 m (6.5 ft)

Table 17 - Power Supply and Power Terminal Blocks

Cat. No.	Description	Quantity
2711P-RSACDIN	DIN-rail power supply, AC-to-DC, 85…265V AC, 47…63 Hz	1
2711P-RY2032	Replacement battery	1
2711P-RTBAC3	AC power terminal block	10
2711P-RTBDC2	2-pin DC power terminal block	10

Table 18 - Bezel Replacements

Cat. No.	Terminal Model	Operator Input		
		Keypad	Touch	Key/Touch
2711P-RBK7	700	•		
2711P-RBT7			•	
2711P-RBB7				•
2711P-RBK10	1000	•		
2711P-RBT10			•	
2711P-RBB10				•
2711P-RBK12	1250	•		
2711P-RBT12			•	
2711P-RBT12H(1)			•	
2711P-RBB12				•
2711P-RBK15	1500	•		
2711P-RBT15			•	
2711P-RBB15				•

(1) Applies to the cat. no. 2711P-RDT12H 1250 high-bright display module.

Table 19 - Adapter Plates

Cat. No.	Adapts This PanelView Plus 6 Terminal	To This Terminal Cutout
2711P-RAK7	700 keypad or keypad/touch	PanelView Standard 900 keypad
2711P-RAT7	700 touch	PanelView Plus 900 touch
2711P-RAK10	1000 keypad or keypad/touch	PanelView 1000/1000e keypad
2711P-RAT10	1000 touch	PanelView 1000/1000e touch
2711P-RAK15	1500 keypad or keypad/touch	PanelView 1200e/1400e keypad
2711P-RAT15	1500 touch	PanelView 1200e/1400e touch
2711P-RAK12E	1250 keypad(1)	PanelView 1200/1400e keypad
2711P-RAT12E2	1250 touch(2)	PanelView 1200 touch
2711P-RAT12E	1250 touch(2)	PanelView 1200e/1400e touch
2711P-RAK12S	1250 keypad(1) or keypad/touch	PanelView Standard 1400 keypad
2711P-RAT12S	1250 touch(2)	PanelView Standard 1400 touch

(1) Applies also to PanelView 1000/1000e keypad or keypad/touch terminals.
(2) Applies also to PanelView 1000/1000e touch terminals.

Install Terminal

ATTENTION: Environment and Enclosure

This equipment is intended for use in a Pollution Degree 2 industrial environment, in overvoltage Category II applications (as defined in IEC 60664-1), at altitudes up to 2000 m (6561 ft) without derating.

The terminals are intended for use with programmable logic controllers. Terminals that are AC powered must be connected to the secondary of an isolating transformer.

This equipment is considered Group 1, Class A industrial equipment according to IEC CISPR 11. Without appropriate precautions, there may be difficulties with electromagnetic compatibility in residential and other environments due to conducted or radiated disturbances.

Korean Radio Wave Suitability Registration - When so marked this equipment is registered for Electromagnetic Conformity Registration as business equipment (A), not home equipment. Sellers or users are required to take caution in this regard.

This equipment is supplied as open-type equipment. It must be mounted within an enclosure that is suitably designed for those specific environmental conditions that will be present and appropriately designed to prevent personal injury resulting from accessibility to live parts. The interior of the enclosure must be accessible only by the use of a tool. The terminals meet specified NEMA, UL type, and IEC ratings only when mounted in a panel or enclosure with the equivalent rating. Subsequent sections of this publication may contain additional information regarding specific enclosure type ratings that are required to comply with certain product safety certifications.

In addition to this publication, see:

- Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1, for additional installation requirements.
- NEMA Standards 250 and IEC 60529, as applicable, for explanations of the degrees of protection provided by different types of enclosure.

North American Hazardous Location Approval

The following information applies when operating this equipment in hazardous locations.	**Informations sur l'utilisation de cet équipement en environnements dangereux.**
When marked, these products are suitable for use in "Class I, Division 2, Groups A, B, C, D"; Class I, Zone 2, Group IIC, Class II, Division II, Groups F, G; Class III hazardous locations and nonhazardous locations only. Each product is supplied with markings on the rating nameplate indicating the hazardous location temperature code. When combining products within a system, the most adverse temperature code (lowest "T" number) may be used to help determine the overall temperature code of the system. Combinations of equipment in your system are subject to investigation by the local Authority Having Jurisdiction at the time of installation.	Les produits marqués "CL I, DIV 2, GP A, B, C, D" ne conviennent qu'à une utilisation en environnements de Classe I Division 2 Groupes A, B, C, D dangereux et non dangereux. Chaque produit est livré avec des marquages sur sa plaque d'identification qui indiquent le code de température pour les environnements dangereux. Lorsque plusieurs produits sont combinés dans un système, le code de température le plus défavorable (code de température le plus faible) peut être utilisé pour déterminer le code de température global du système. Les combinaisons d'équipements dans le système sont sujettes à inspection par les autorités locales qualifiées au moment de l'installation.
WARNING: EXPLOSION HAZARD • Do not disconnect equipment unless power has been removed or the area is known to be nonhazardous. • Do not disconnect connections to this equipment unless power has been removed or the area is known to be nonhazardous. • Substitution of components may impair suitability for Class I, Division 2. • Peripheral equipment must be suitable for the location in which it is used. • The battery or real-time clock module in this product must only be changed in an area known to be nonhazardous. • All wiring must be in accordance with Class I, Division 2, Class II, Division 2, or Class III, Division 2 wiring methods of Articles 501, 502 or 503, as appropriate, of the National Electrical Code and/or in accordance with Section 18-1J2 of the Canadian Electrical Code, and in accordance with the authority having jurisdiction.	**AVERTISSEMENT : RISQUE D'EXPLOSION** • Couper le courant ou s'assurer que l'environnement est classé non dangereux avant de débrancher l'équipement. • Couper le courant ou s'assurer que l'environnement est classé non dangereux avant de débrancher les connecteurs. • La substitution de composants peut rendre cet équipement inadapté à une utilisation en environnement de Classe I, Division 2 • Les équipements périphériques doivent s'adapter à l'environnement dans lequel ils sont utilisés. • La batterie ou le module de l'horloge en temps réel de ce produit doit être changé(e) uniquement dans un environnement classé sans risque. • Tous les systèmes de câblage doivent être de Classe I, Division 2, Classe II, Division 2, ou Classe III, Division 2, conformément aux méthodes de câblage indiquées dans les Articles 501, 502 ou 503 du National Electrical Code (Code Electrique National) et/ou conformément à la Section 18-1J2 du Canadian Electrical Code (Code Electrique Canadien), et en fonction de l'autorité de jurisdiction.

DC-powered terminals have a temperature code of T4 when operating in a 55 °C (131 °F) maximum ambient temperature. Do not install terminals in environments where atmospheric gases have ignition temperatures less than 135 °C (275 °F).

The AC-powered terminals have a temperature code of T3 when operating in a 55 °C (131 °F) maximum ambient temperature. Do not install terminals in environments where atmospheric gases have ignition temperatures less then 200 °C (392 °F).

USB Ports

The terminals contain USB host ports that comply with hazardous location environments. Field wiring compliance requirements are provided in compliance with the National Electrical Code, Article 500.

Figure 3 - PanelView Plus 6 Terminals Control Drawing

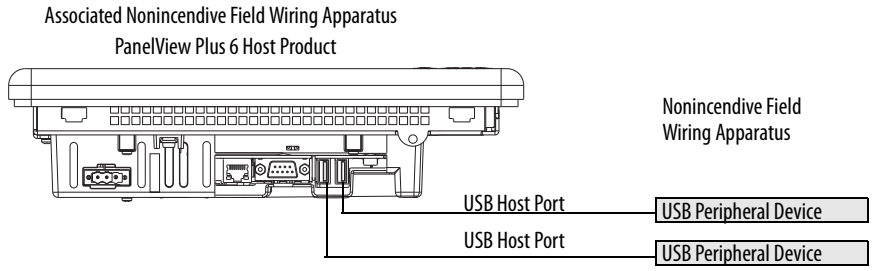


Table 20 - PanelView Plus 6 USB Port Circuit Parameters

V_{oc}	I_{sc}	C_a		L_a	
		Groups A and B	Groups C and D	Groups A and B	Groups C and D
5.25V DC	1.68 A	10 µF	10 µF	15 µH	15 µH

Selected nonincendive field wiring apparatus must have nonincendive circuit parameters conforming with Table 21.

Table 21 - Required Circuit Parameters for the USB Peripheral Device

V_{max}	≥	V_{oc}
I_{max}	≥	I_{sc}
$C_i + C_{cable}$	≤	C_a
$L_i + L_{cable}$	≤	L_a

Application Information

Per the National Electrical Code, the circuit parameters of nonincendive field wiring apparatus for use in hazardous locations shall be coordinated with the associated nonincendive field wiring apparatus such that their combination remains nonincendive. The PanelView Plus 6 terminals and the USB peripheral devices shall be treated in this manner.

The circuit parameters of the PanelView Plus 6 USB ports are given in Table 20 on page 27. The USB peripheral device and its associated cabling shall have circuit parameters with the limits given in Table 21 on page 27 for them to remain nonincendive when used with the PanelView Plus 6 USB port. If cable capacitance and inductance are not known, the following values from ANSI/ISA-RP 12.06.01-2003 may be used:

C_{cable} = 197 µF/m (60 µF/ft)
L_{cable} = 0.7 µH/m (0.20 µH/ft)

Nonincendive field wiring must be wired and separated in accordance with 501.10(B)(3) of the National Electrical Code (NEC) ANSI/NFPA 70 or other local codes as applicable.

This associated nonincendive field wiring apparatus has not been evaluated for use in combination with another associated nonincendive field wiring apparatus.

Table 22 - Symbol Definitions

V_{oc}	Open circuit voltage of the host USB port.
I_{sc}	Maximum output current of the host USB port.
V_{max}	Maximum applied voltage rating of the USB peripheral device. V_{max} shall be greater than or equal to V_{oc} in Table 21 ($V_{max} \geq V_{oc}$).
I_{max}	Maximum current to which the USB peripheral device can be subjected. I_{max} shall be greater than or equal to I_{sc} in Table 21 ($I_{max} \geq I_{sc}$).
C_i	Maximum internal capacitance of the USB peripheral device.
C_a	Maximum allowed capacitance of the USB peripheral device and its associated cable. The sum of C_i of the USB peripheral device and C_{cable} of the associated cable shall be less than or equal to C_a ($C_i + C_{cable} \leq C_a$).
L_i	Maximum internal inductance of the USB peripheral device.
L_a	Maximum allowed inductance of the USB peripheral device and its associated cable. The sum of L_i of the USB peripheral device and L_{cable} of the associated cable shall be less than or equal to L_a ($L_i + L_{cable} \leq L_a$).

Outdoor Installation for High-bright Displays

When using a high-bright display module outdoors, catalog number 2711P-RDT12H, there are important considerations in maximizing the field-life of the front bezel and display:

- Using an antiglare overlay and visor
- Selecting the proper enclosure
- Using the proper orientation of the terminal

Ultraviolet and infrared radiation can reduce the field life of any electronic device. While the materials used in the terminal bezels provide long field life, that field life can be extended by proper installation.

IMPORTANT	The high-bright display module is compatible only with DC-powered logic modules, catalog numbers 2711P-RP8D, 2711P-RP8DK, 2711P-RP9D, 2711P-RP9DK. It cannot be used with AC-powered logic modules.

Using an Antiglare Overlay

Ultraviolet (UV) radiation from the sun causes all plastics to fade or yellow, and become brittle over time. Using an antiglare overlay, catalog number 2711P-RGT12, will protect the front of the terminal from direct exposure to UV radiation and increase its field life.

Using a Solar Visor

If the high-bright display module will be in direct sunlight during the hottest part of the day and the external ambient temperature exceeds 40 °C (104 °F), use the visor kit, catalog number 2711P-RVT12. The visor reduces the solar load on the front of the display and helps to maintain temperatures within specification.

The high-bright display module has a built-in temperature sensor that automatically reduces the backlight intensity if the temperature inside the cabinet exceeds 55 °C (131 °F). This reduces the risk of damage to the display.

Selecting an Enclosure

The paint, color, size, and power dissipated by the internal components of an enclosure affect the temperature rise inside the cabinet. Hoffman, a Rockwell Automation Encompass Partner, has information to help you select an enclosure, and heating/cooling accessories to meet the temperature requirements of the installed equipment. See http://www.hoffmanonline.com.

Stirring fans or active cooling may be required in high altitude and high ambient temperature locations to keep the internal enclosure temperature below 55 °C (131 °F). Use a heater in installations where the ambient temperature is below 0 °C (32 °F).

Backlight Considerations

The backlight of the high-bright display generates a significant amount of heat when set to full intensity. To minimize the amount of heat generated and extend the life of the backlight, decrease the display intensity by using the screen saver with a 5...10 minute delay.

Orientation of the Terminal

If outside, avoid placing the terminal on the south (north in the southern hemisphere) or west side of cabinet, if possible. This will reduce the heat rise due to solar loading during the hottest part of the day.

Mount the terminal vertically to minimize the solar loading on the display. Do not mount the terminal in a sloped enclosure if it will be exposed to direct sunlight.

Required Tools

These tools are required for panel installation:

- Panel cutout tools
- Small, slotted screwdriver
- Torque wrench for tightening the terminal mounting clips

Clearances

Allow adequate spacing around the terminal, inside the enclosure, for adequate ventilation. Consider heat produced by other devices in the enclosure. The ambient temperature around the terminals must be between 0...55 °C (32...131 °F).

These minimum clearances are required for ventilation:

- Top clearance: 51 mm (2 in.)
- Bottom clearance: 102 mm (4 in.)
- Side clearances: 25 mm (1 in.)
- Back clearance: 25 mm (1 in.)

Minimum side clearance for inserting an SD card is 102 mm (4 in.).

Panel Cutout Dimensions

Use the full size template shipped with your terminal to mark the cutout dimensions.

Terminal Type	Height, mm (in.)	Width, mm (in.)
700 keypad or keypad/touch	167 (6.57)	264 (10.39)
700 touch	154 (6.08)	220 (8.67)
1000 keypad or keypad/touch	224 (8.8)	375 (14.75)
1000 touch	224 (8.8)	305 (12.00)
1250 keypad or keypad/touch	257 (10.11)	390 (15.35)
1250 touch(1)	257 (10.11)	338 (13.29)
1500 keypad or keypad/touch	305 (12.00)	419 (16.50)
1500 touch	305 (12.00)	391 (15.40)

(1) Also applies to high-bright display module, cat. no. 2711P-RDT12H also.

Product Dimensions

The table provides product dimensions for the terminals. The 1000 keypad and keypad/touch terminals are shown for illustrative purposes. All other terminal sizes look similar.

Figure 4 - PanelView Plus 6 Terminal Dimensions - Model 1000

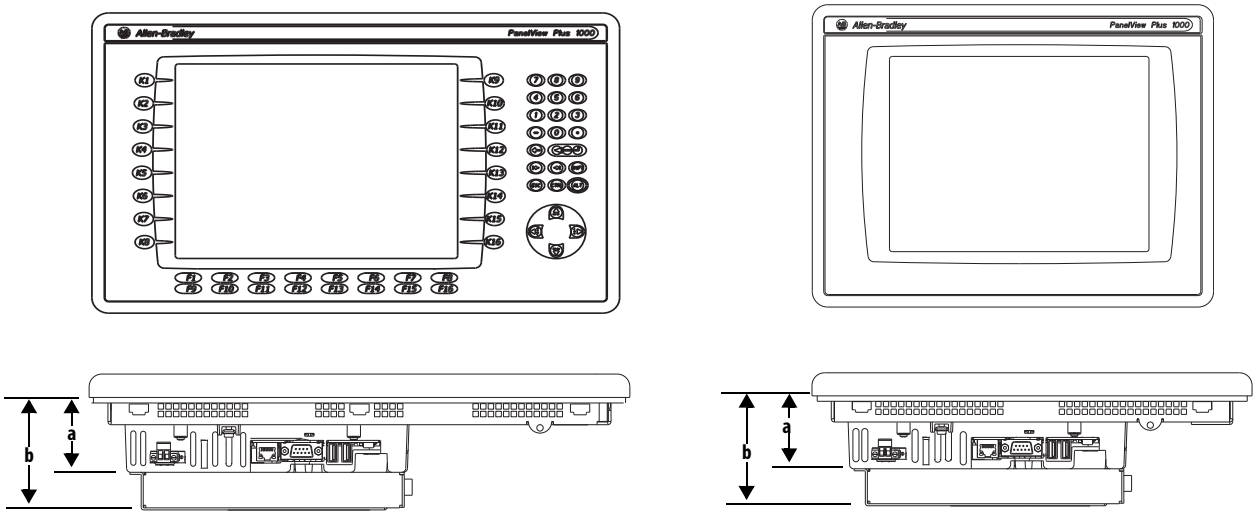


Table 23 - PanelView Plus 6 Terminal Dimensions

Terminal Model	Width	Height	Depth a Display to Logic Module	Depth b Display to Comm Module
700 keypad or keypad/touch	290 mm 11.40 in.	193 mm 7.58 in.	55 mm 2.18 in.	83 mm 3.27 in.
700 touch	246 mm 9.68 in.	179 mm 7.04 in.	55 mm 2.18 in.	83 mm 3.27 in.
1000 keypad or keypad/touch	399 mm 15.72 in.	248 mm 9.77 in.	55 mm 2.18 in.	83 mm 3.27 in.
1000 touch	329 mm 12.97 in.	248 mm 9.77 in.	55 mm 2.18 in.	83 mm 3.27 in.
1250 keypad or keypad/touch	416 mm 16.36 in.	282 mm 11.12 in.	55 mm 2.18 in.	83 mm 3.27 in.
1250 touch	363 mm 14.30 in.	282 mm 11.12 in.	55 mm 2.18 in.	83 mm 3.27 in.
1250 high-bright touch	363 mm 14.30 in.	282 mm 11.12 in.	74 mm 2.9 in.	101 mm 3.99 in.
1500 keypad or keypad/touch	469 mm 18.46 in.	330 mm 12.97 in.	65 mm 2.55 in.	93 mm 3.65 in.
1500 touch	416 mm 16.37 in.	330 mm 12.97 in.	65 mm 2.55 in.	93 mm 3.65 in.

Mount the Terminal in a Panel

Mounting clips secure the terminal to the panel. The number of clips you use varies by terminal size.

ATTENTION: Disconnect all electrical power from the panel before making the panel cutout.

Make sure the area around the panel cutout is clear.

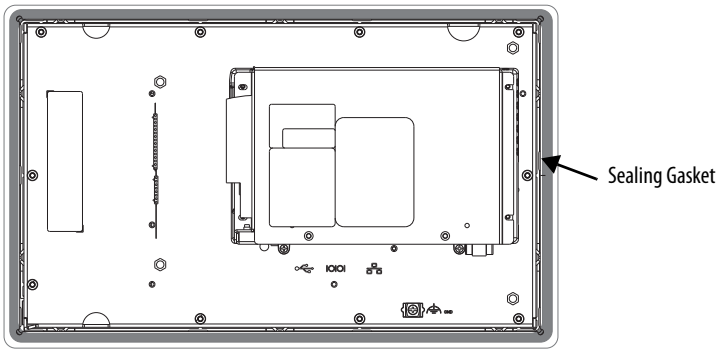
Take precautions so metal cuttings do not enter any components already installed in the panel.

Failure to follow these warnings may result in personal injury or damage to panel components.

Follow these steps to mount the terminal in a panel.

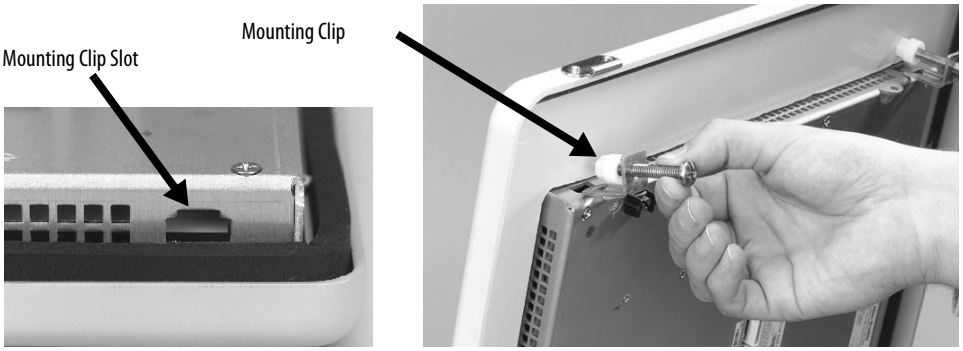
1. Cut an opening in the panel by using the panel cutout template shipped with the terminal.
2. Make sure the terminal sealing gasket is properly positioned on the terminal.

   This gasket forms a compression type seal. Do not use sealing compounds.



   Be careful not to pinch the legend strip during installation.

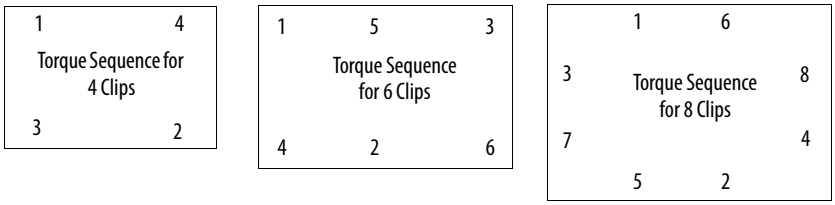
3. Place the terminal in the panel cutout.



4. Slide the ends of the mounting clips into the slots on the terminal.

5. Tighten the mounting clip screws by hand until the gasket seal contacts the mounting surface uniformly.

6. Tighten the mounting clips screws to a torque of 0.90...1.1 N•m (8...10 lb•in) by using the specified sequence, making sure not to overtighten.



ATTENTION: Tighten the mounting clips to the specified torque to provide a proper seal and to prevent damage to the product. Allen-Bradley assumes no responsibility for water or chemical damage to the product or other equipment within the enclosure because of improper installation.

Notes:

Connect Power

ATTENTION: Wiring and Safety Guidelines

Use publication NFPA 70E, Electrical Safety Requirements for Employee Workplaces, IEC 60364 Electrical Installations in Buildings, or other applicable wiring safety requirements for the country of installation when wiring the devices. In addition to the NFPA guidelines, here are some other guidelines to follow:

- Connect the device and other similar electronic equipment to its own branch circuit.
- Protect the input power by a fuse or circuit breaker rated at no more than 15 A.
- Route incoming power to the device by a separate path from the communication lines.
- Cross power and communication lines at right angles if they must cross. Communication lines can be installed in the same conduit as low-level
  DC I/O lines (less than 10V).
- Shield and ground cables appropriately to avoid electromagnetic interference (EMI). Grounding minimizes noise from EMI and is a safety measure in electrical installations.

For more information on grounding recommendations, refer to the National Electrical Code published by the National Fire Protection Association.

Remove and Install the Power Terminal Block

The terminals are shipped with a power terminal block installed. You can remove the terminal block for ease of installation, wiring, and maintenance:

- Logic modules with a DC power input use a two-position terminal block.
- Logic modules with an AC power input use a three-position terminal block.

WARNING: Explosion Hazard

Substitution of components may impair suitability for hazardous locations.

Do not disconnect equipment unless power has been switched off and area is known to be nonhazardous.

Do not connect or disconnect components unless power has been switched off.

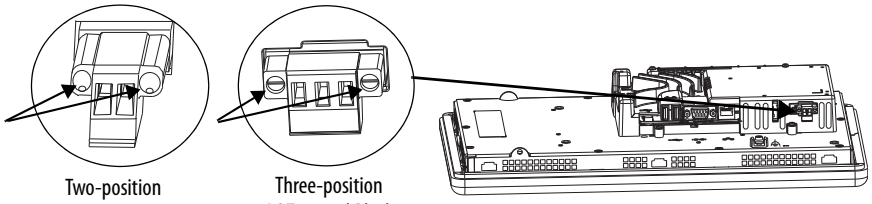
All wiring must comply with N.E.C. articles 501, 502, 503, and/or C.E.C. section 18-1J2 as appropriate.

Peripheral equipment must be suitable for the location in which it is used.

SHOCK HAZARD: Disconnect all power before installing or replacing components. Failure to disconnect power may result in electrical shock or damage to the terminal.

Follow these steps to remove the terminal block.

1. Loosen the two screws that secure the terminal block.
2. Gently pull the terminal block away from the connector.



Follow these steps to install the terminal block.

1. Reattach the terminal block to the connector until seated.
2. Tighten the two screws that secure the terminal block to the connector.

DC Power Connections

DC-powered PanelView Plus 6 devices have an integrated, isolated 24V DC power supply with these power ratings:

- 24V DC nominal (18...32V DC)
- 70 W maximum (2.9 A at 24V DC)

The power supply is internally protected against reverse polarity of the DC+ and DC- connections. Connecting DC+ or DC- to the earth/ground terminal may damage the device.

The input power terminal block supports these wire sizes.

Table 24 - Wire Specifications for DC Input Power Terminal Block

Wire Type		Dual-wire Gauge(1)	Single-wire Gauge	Terminal Screw Torque
Stranded or solid	Cu 90 °C (194 °F)	0.3…1.3 mm^2 22…16 AWG	0.3…2.1 mm^2 (22…14 AWG)	0.56 N•m (5 lb•in)

(1) Two-wire max per terminal.

External Power Supply

Use a SELV or PELV 24V DC power supply, such as catalog number 2711P-RSACDIN, to power PanelView Plus 6 terminals with a DC power input.

The terminals may be powered by the same power source as other equipment, by a DC power bus.

ATTENTION: Use a SELV or PELV supply as required by local wiring codes for your installation. The SELV and PELV power sources provide protection so that under normal and single fault conditions, the voltage between conductors and earth ground does not exceed a safe value.

Earth/Ground Connection

PanelView Plus 6 devices with a DC power input have an earth/ground terminal that you must connect to a low-impedance earth/ground. The earth/ground connection is on the rear of the display module.

IMPORTANT The earth/ground connection to ground is mandatory. This connection is required for noise immunity, reliability, and Electromagnetic Compliance (EMC) with the European Union (EU) EMC directive for CE-mark conformance. This connection is required for safety by Underwriters Laboratory.

The earth/ground terminal requires a minimum wire gauge.

Table 25 - Earth/Ground Wire Specifications for DC Power

Symbol	Wire Type		Wire Gauge	Terminal Screw Torque
GND	Stranded or solid	Cu 90 °C (194 °F)	2.1…5.3 mm^2 (14…10 AWG)	1.13…1.36 N•m (10…12 lb•in)

ATTENTION: Damage or malfunction can occur when a voltage potential exists between two separate ground points. Make sure the terminal does not serve as a conductive path between ground points at different potentials

All of the communication ports on the supported communication modules and the terminal itself are isolated, with the exception of the USB ports.

Connect DC Power

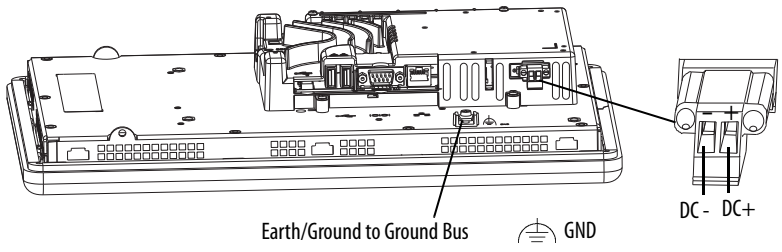
WARNING: Explosion Hazard
Do not disconnect equipment unless power has been switched off and area is known to be nonhazardous.

Disconnect all power before installing or replacing components. Failure to disconnect power may result in electrical shock or damage to the terminal.

Follow these steps to connect the terminal to DC power.

1. Verify that the terminal is not connected to a power source.
2. Secure the DC power wires to the terminal block.

   Follow the markings on the terminal blocks and the terminal for proper connections.
3. Secure the earth/ground wire to the earth/ground terminal screw at the bottom of the display.



4. Apply power to the terminal.

AC Power Connections

PanelView Plus 6 devices with an integrated AC power supply have these power ratings:

- 85...264V AC (47...63 Hz)
- 160 VA max

The input power terminal block supports these wire sizes.

Table 26 - Wire Specifications for AC Input Power Terminal Block

Wire Type		Dual-wire Gauge(1)	Single-wire Gauge	Terminal Screw Torque
Stranded or solid	Cu 90 °C (194 °F)	0.3…1.3 mm^2 22…16 AWG	0.3…2.1 mm (22…14 AWG)	0.56 N•m (5 lb•in)

(1) Two-wire max per terminal.

Protective Earth and Functional Earth Connection

PanelView Plus 6 devices with an AC power input have both a protective earth and functional earth terminal that you must connect to a low-impedance earth ground:

- Protective earth terminal is on the power input terminal block.
- Functional earth connection is on the back of the display.

ATTENTION: The functional earth and protective earth connections to ground are mandatory. The functional earth ground connection is required for electromagnetic compliance (EMC) with the EU (European Union) EMC directive for CE-mark conformance. The protective earth ground connection is required for safety and regulatory compliance.

IMPORTANT On PanelView Plus 6 devices with an AC power input, you must connect both protective earth and functional earth to ground.

The protective earth and functional earth terminals require a minimum wire gauge.

Table 27 - Functional Earth and Protective Earth Wire Specifications for AC Power

Connection		Wire Type		Wire Gauge	Terminal Screw Torque
Protective earth	⏚	Stranded or solid	Cu 90 °C (194 °F)	2.1…3.3 mm^2 (14…12 AWG)	0.56 N•m (5 lb•in)
Functional earth	GND	Stranded or solid	Cu 90 °C (194 °F)	2.1…5.3 mm^2 (14…10 AWG)	1.13…1.36 N•m (10…12 lb•in)

Connect AC Power

WARNING: Explosion Hazard
Do not disconnect equipment unless power has been switched off and area is known to be nonhazardous.

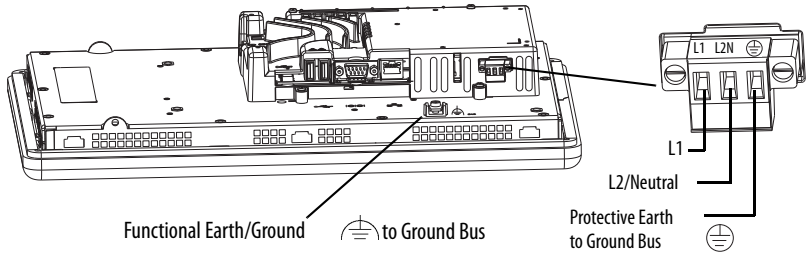
Disconnect all power before installing or replacing components. Failure to disconnect power may result in electrical shock or damage to the terminal.

ATTENTION: Improper wiring of the power terminals may result in voltage at the communication connector shells.

Do not apply power to the terminal until all wiring connections have been made. Failure to do so may result in electrical shock.

Follow these steps to connect the terminal to AC power.

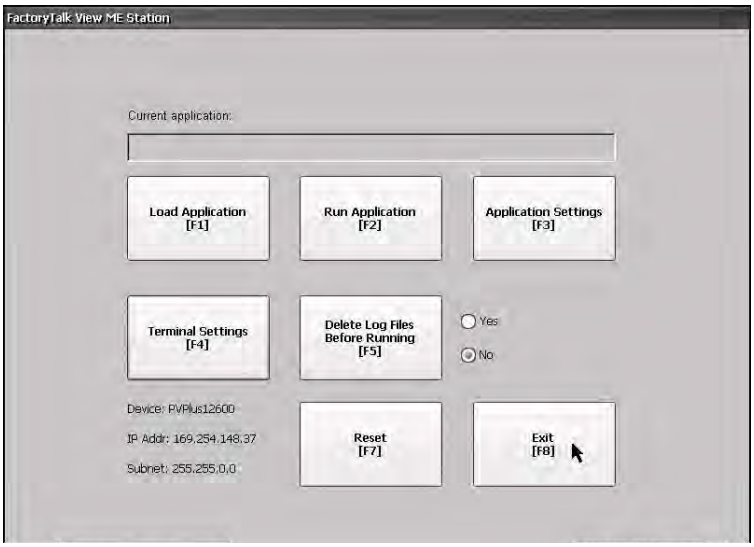
1. Verify that the terminal is not connected to a power source.
2. Secure the AC power wires to the terminal block.
   Follow the markings on the terminal block and terminal for proper connections.
3. Secure the protective earth/ground wire to the marked position of the power input terminal block.
4. Secure the functional earth/ground wire to the functional earth terminal screw on the back of the display to ground bus.



5. Apply power to the terminal.

Initial Startup

The first time you start the system, the terminal goes through its power-up sequence and launches FactoryTalk View ME Station, the Configuration mode of the terminal.



You can change the action the terminal takes on startup by choosing Terminal Settings>Startup Options. You can do one of the following:

- Launch FactoryTalk Machine Edition and run an HMI application that is configured to run at startup.
- Launch FactoryTalk View Machine Edition and run the configuration options for the terminal (default, shown above).
- Launch the Windows Explorer desktop.

All PanelView Plus 6 terminals can also be configured to allow desktop access. Terminals are initially shipped with desktop access disabled. To allow or restrict desktop access, choose Terminal Settings>Desktop Access.

For more information on changing the start-up option and restricting or allowing desktop access, refer to Chapter 4 - Configuration Mode.

Reset the Terminal

You have these options for restarting the terminal without having to disconnect and reapply power:

- Use the Reset switch on the back of the terminal.
- Select the Restart System command from the desktop Start menu.
- Select Reset from the FactoryTalk View ME Station configuration screen.

After a restart, the terminal performs a series of startup tests then takes one of these actions:

- Launches FactoryTalk Machine Edition and runs an HMI application that is configured to run at startup.
- Launches FactoryTalk Machine Edition and runs configuration options for the terminal.
- Launches the Windows Explorer desktop shell.

The action that occurs depends on the startup options configured for your terminal. Refer to Startup Options on page 49 for details.

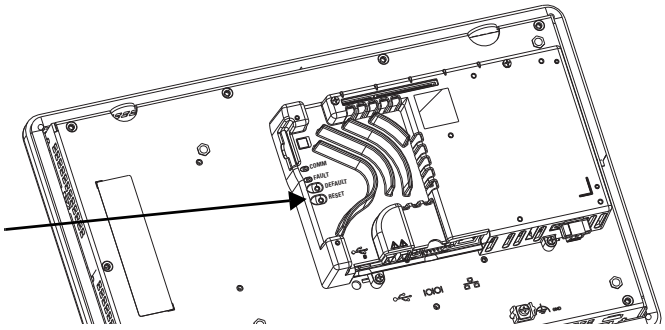
Refer to Start-up Messages and Codes on page 162 for a list of startup information and error messages.

Follow these steps to restart the system using the Reset switch.

1. Insert a thin, nonconductive probe into the Reset area.
2. Press the switch.

ATTENTION: Use a nonconductive object to press the reset switch. Don't use a conducting object such as a paper clip or the tip of a pencil. Either of these may damage the terminal.

Figure 5 - Reset Switch



Follow these steps to restart the system from the Windows desktop.

1. From the Start menu, choose Programs>Restart System.

   You are asked to confirm the restart.
2. Click Yes to restart the terminal or No to cancel.

Follow these steps to restart the system from FactoryTalk View ME Station.

1. Access Configuration Mode.

   Refer to Access Configuration Mode on page 43 for ways to launch FactoryTalk View ME Sation.
2. Select Reset [F7].

Configuration Mode

Access Configuration Mode

The terminal uses onboard software, FactoryTalk View ME Station, to configure startup options, load and run applications, access the Windows desktop, and perform other terminal operations. When you reset the terminal, one of these actions occur, depending on the configured startup option:

- FactoryTalk View ME Station is launched, which is the Configuration mode of the terminal (closed system). This is the initial default.
- The Windows Explorer desktop is launched (open system).
- FactoryTalk View Machine Edition .mer application is set to run (closed system).

From Windows Explorer desktop, you can access the Configuration mode of the terminal by double-clicking the FactoryTalk View ME Station icon on the desktop.

IMPORTANT

- To access Configuration mode from a running application, press the Goto Configuration Mode button. This button is added to application screens in FactoryTalk View Studio software during application development. The application stops running but is still loaded.
- Refer to Configuration Mode Access on page 167 for details on how to access Configuration mode if the applicaton does not contain a Goto Configuration Mode button.

Figure 6 - FactoryTalk View ME Station Configuration Mode Dialog Box

Name of application that is currently loaded. Appears only if application is loaded.

Displays network information every 60 seconds. If the network is shutdown the IP address and subnet mask appear as 0.0.0.0.

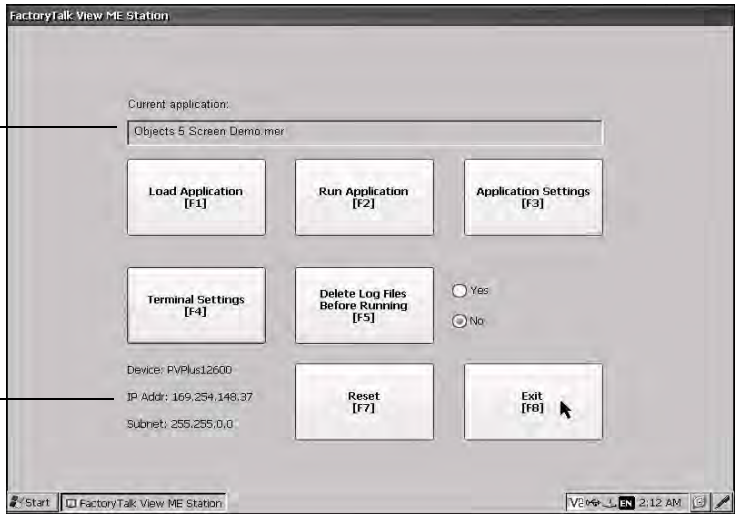


Table 28 - Configuration Mode Operations

Terminal Operation	Description
Load Application (F1)	Opens a dialog box where you select an application to load. The loaded application name appears under Current application.
Run Application (F2)	Runs the loaded .mer application displayed under Current application. You must load an application before running it.
Application Settings (F3)	Opens a menu of application-specific configuration settings, such as device shortcuts defined for the loaded .mer application. Device shortcuts are read-only and cannot be edited. For example, your .MER application might have CLX defined as a device shortcut name for a ControlLogix® controller.
Terminal Settings (F4)	Opens a menu of options to configure non-application, terminal settings for the PanelView Plus 6 device.
Delete Log Files Before Running (F5)	Toggles between Yes and No. If you select Yes, all data log files, alarm history and alarm status file will be deleted before the application is run. If you select No, log files are not deleted first. Deleting log files is a way to reclaim memory in the terminal.
Reset (F7)	Resets the terminal. • On open Windows CE terminals, the desktop is launched. • On closed Windows CE terminals, the action on startup depends on configured startup options.
Exit (F8)	Exits Configuration mode. If desktop access is allowed, you can access the desktop.

Navigation Buttons

Many FactoryTalk View ME Station dialog boxes have data entry and navigation buttons:

- On touch-screen terminals, tap the button with your finger or stylus.
- On keypad terminals, select the function key listed on the button.
- If a mouse is attached, click a button.

Table 29 - Navigation Buttons

Button	Description	Button	Description
Close [F8]	Returns to the previous dialog box. Pressing this button from the Configuration mode dialog will access the desktop, if allowed.	▲ ▼	Moves highlight up or down a list.
OK [F7] Cancel [F8]	Accepts changes and returns to previous dialog box or cancels the operation without saving changes.	↵	Selects a highlighted function or item from a list.

Input Panel

When you press a button or function key on a data entry field, the input panel opens. This is where you enter or edit data:

- If a field is restricted to a numeric value, only the 0...9 keys will be enabled.
- If the value is an IP address, the 0...9 and decimal point keys will be enabled. All other buttons will be disabled.

Figure 7 - Input Panel

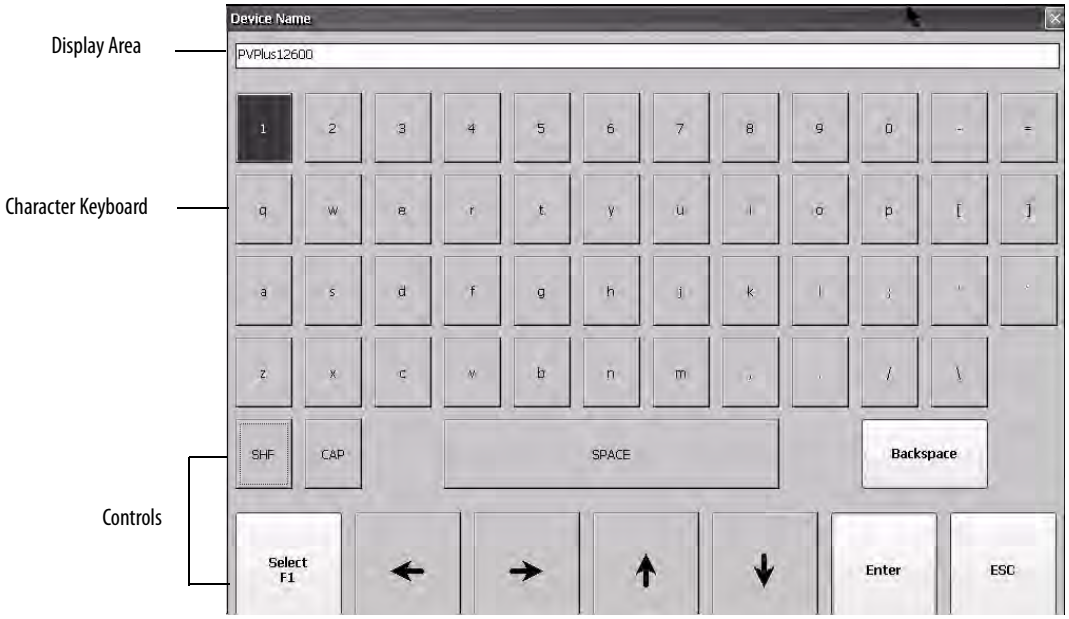


Table 30 - Input Panel Controls

Input Panel Controls	Function
SHF	Switches keys between their shifted and unshifted state. The initial default is unshifted.
CAPS	Switches keys between lowercase and uppercase characters. The initial default is lowercase.
SPACE	Enters a space between characters in the Display Area.
Backspace	Deletes the previous character (to the left of the cursor) in the Display Area.
Select	Selects a character and enters it in the Display Area.
Right, Left, Up, Down Arrow Keys	Selects the character to the right, left, above or below the currently selected character.
Enter	Accepts the entered characters and returns to the previous dialog box.
ESC	Cancels the current operation and returns to the previous dialog box.

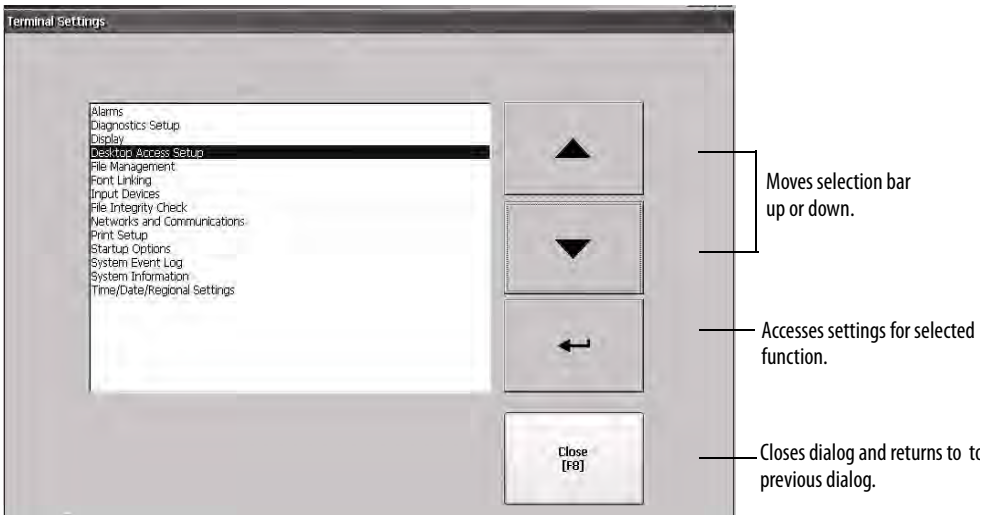
Follow these steps to enter characters in the display area.

1. Select a character on the character keyboard.
   - On a touch-screen terminal, tap or press a key.
   - On a keypad terminal, use the arrow keys on the keypad to select a key.
   - If a mouse is attached, click a key.
2. Press the Select button to copy the character to the display area.
3. Press Enter when done to exit the input panel.

Terminal Settings

You can modify settings on the terminal that are not specific to the application.

1. Select Terminal Settings from the FactoryTalk View ME Station Configuration mode dialog.

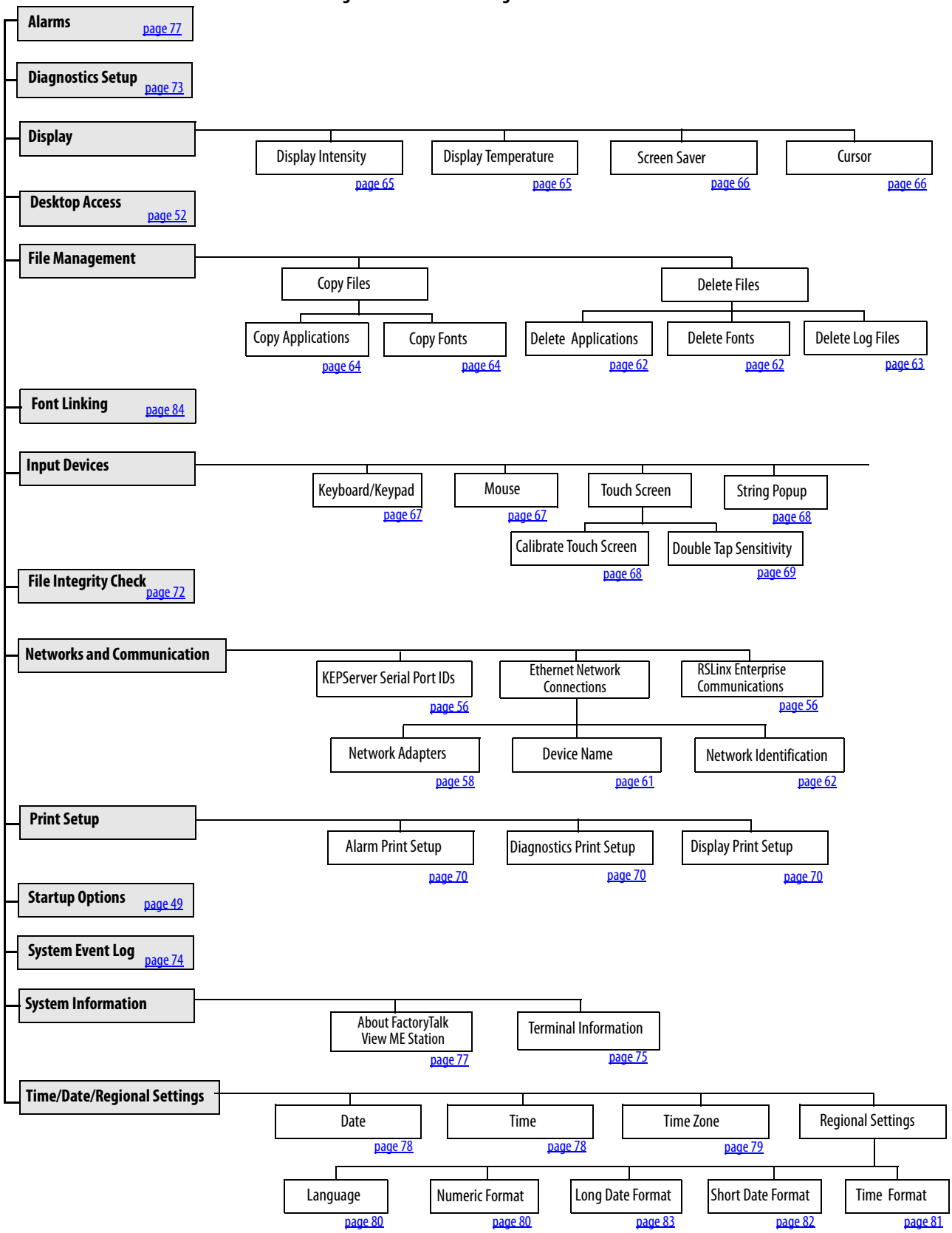


2. Select a function by using the up and down cursor buttons.
   - On touch-screen terminals, press the button.
   - On keypad terminals, press the key on the keypad or the corresponding terminal function key.
3. Press the Enter key to access selected function.

Table 31 - Terminal Settings

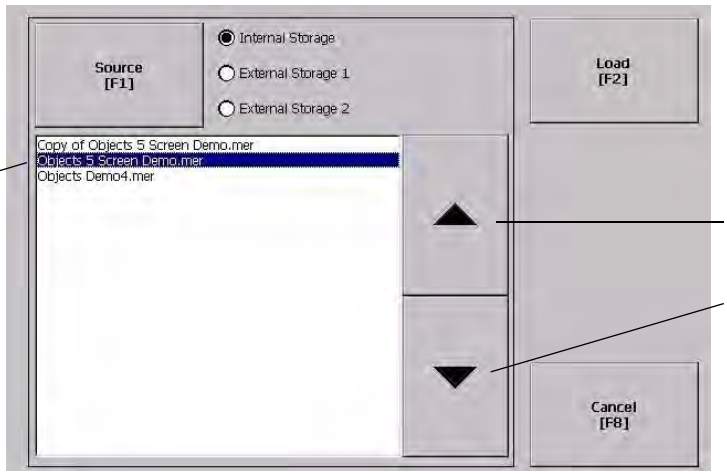
Terminal Settings	Description
Alarms	Specifies whether to close the alarm display on the terminal when the newest alarm is acknowledged by an operator. By default, the alarm display is closed.
Diagnostics Setup	Forwards diagnostic messages form a remote log destination to a computer running diagnostics.
Display	Sets the intensity of the backlight, shows the temperature of the displays, configures the screen saver, and enables the touch-screen cursor.
Desktop Access Setup	Specifies whether the desktop can be accessed with or without a password, and lets you set/reset the password.
File Management	Copies or deletes application files and font files from the terminal by using an SD card or a USB flash drive. You can also delete all FactoryTalk View ME Station log files.
Font Linking	Links a font file to a base font loaded on the terminal.
Input Devices	Configures settings for the keypad, touch screen, or attached keyboard and mouse, including touch-screen calibration. Also lets you choose between a pop-up character input or pop-up keyboard for string input.
File Integrity Check	Checks the integrity of the .mer application file and runtime files by logging details to a file integrity check log. You can view and clear this log at any time.
Networks and Communications	Configures Ethernet settings and communication settings for serial, DHPlus, DH-485, and ControlNet applications.
Print Setup	Configures settings for printing displays, alarm messages, and diagnostics messages generated by the application.
Startup Options	Specifies whether the terminal launches the desktop, Configuration mode, or runs an application on startup.
System Event Log	Displays system events logged by the terminal and lets you clear events from the log.
System Information	Displays power, temperature, battery and memory details for the terminal. Also shows the firmware number for FactoryTalk View ME software and technical support information.
Time/Date/Regional Settings	Sets the date, time, language, and numeric format used by the terminal and applications.

Figure 8 - Terminal Settings Menu Structure



Load and Run Application

Before running a FactoryTalk View Machine Edition .mer application, you must first load the application. You can load an .mer application from internal storage or nonvolatile memory in the terminal, an SD card, or a USB flash drive.



Follows these steps to load and run an application.

1. Press the Load Application from the Configuration mode dialog box.
2. Press the Source button to select the location of the file you want to load.
   - Internal Storage - nonvolatile memory of the terminal.
   - External Storage 1 - SD card loaded in the card slot of the terminal.
   - External Storage 2 - USB flash drive connected to a USB host port.

   TIP FactoryTalk View ME Station recognizes only Machine Edition files in the My Device\Application Data\Rockwell Software\RSViewME\Runtime\ folder.
3. Select an .mer file from the list by using the up and down cursor keys.
4. Press the Load button to load the selected application.

   You will be asked if you want to replace the terminal's communication configuration with the configuration in the application.
5. Select Yes or No.

   If you select Yes, any changes to the device addresses or driver properties in the RSLinx® Communications dialog box will be lost.

   The name of the currently loaded application will appear at the top of the main Configuration mode dialog box.
6. Press the Run button on the Configuration mode dialog box to run the loaded application.

   TIP Log files are generated by the application. To delete the log files before running an application, select the Delete Log Files Before Running button on the Configuration Mode dialog box. You can reclaim memory in the terminal by deleting log files.

   TIP Refer to Load and Run Application on page 48 to set the application to automatically run on startup or a terminal reset.

Startup Options

You can specify what action the terminal takes on startup or a reset.

This Start-up Option	Performs This Action	Typical System
Do not start FactoryTalk View ME Station	Launches the Windows Explorer desktop on startup.	Open
Go to Configuration Mode	Launches FactoryTalk View ME Station Configuration mode on startup. This is the initial, factory default setting.	Closed
Run Current Application	Runs the FactoryTalk View ME application loaded in the terminal on startup.	Closed

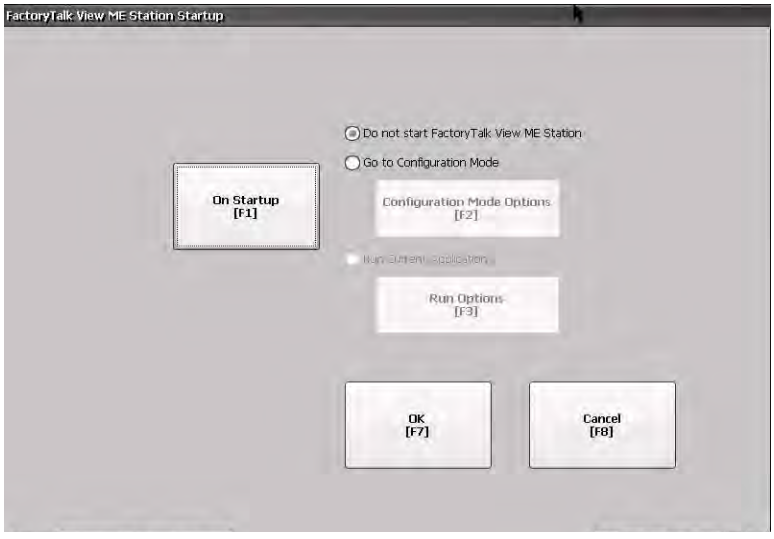
IMPORTANT When desktop access is restricted, the startup option must be set to Run Current Application or Go to Configuration Mode (default). Refer to page 53 for details on how to disable desktop access.

Disable FactoryTalk View ME Station Software on Startup

FactoryTalk View ME Station is typically disabled on startup for terminals with extended features, allowing the desktop to launch. The desktop can also be launched from FactoryTalk View ME Station by pressing the Exit button on the Configuration mode dialog box.

Follow these steps to disable FactoryTalk View ME Station on startup so that the desktop can launch.

1. Select Terminal Settings>Startup Options.



2. Press the On Startup button until 'Do not start FactoryTalk View ME' is selected.

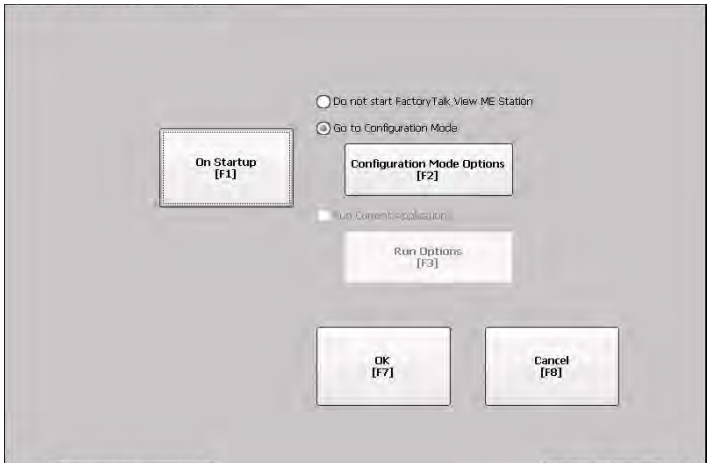
   TIP When disabling FactoryTalk View ME Station, desktop access must be set to allow or you will receive a warning. Refer to Enable Desktop Access on page 52 for details.

3. Press OK.

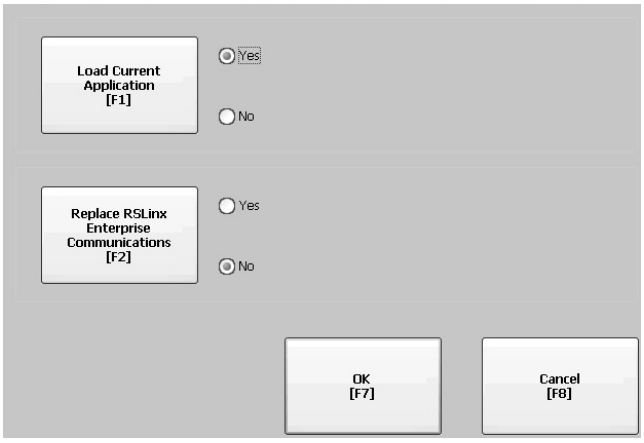
Enter Configuration Mode on Startup

Follow these steps to automatically launch the FactoryTalk View ME Station Configuration mode dialog box on startup.

1. Choose Terminal Settings>Startup Options.
2. Press the On Startup button to select Go to Configuration Mode.



3. Press the Configuration Mode Options button.

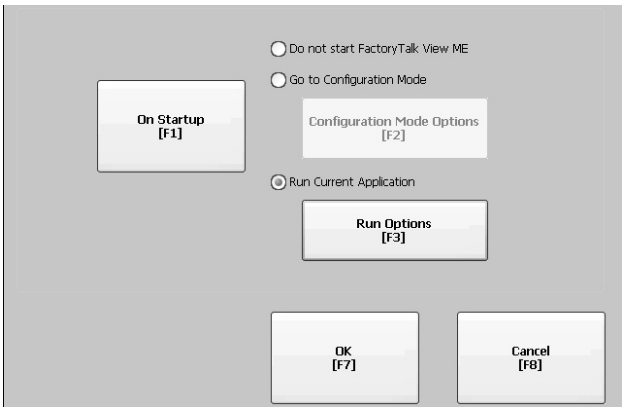


4. Press the Load Current Application button to specify whether you want to load the current application on startup.
5. Press the Replace RSLinx Communications button to specify whether to use the communication configuration of the current application or that of the terminal on startup.
   - Select No to use the RSLinx configuration of the terminal.
   - Select Yes to use the configuration of the application. The terminal configuration is replaced with the application settings. Any changes to device addresses or driver properties in RSLinx communication will be lost.
6. Press OK to return to the previous dialog box.
7. Press OK to return to Terminal Settings.

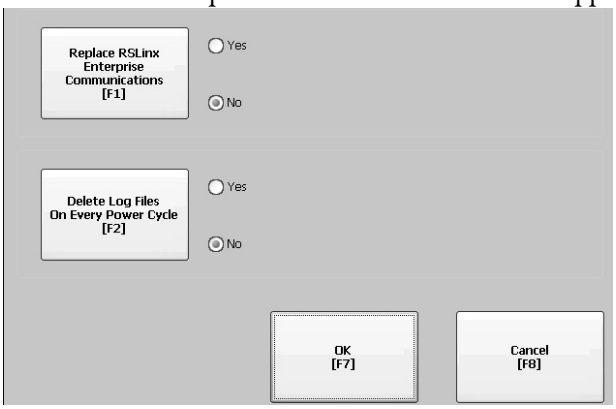
Run the Loaded Application on Startup

Follow these steps to run the FactoryTalk View .mer application currently loaded in the terminal on startup. This is typical when running a closed system.

1. Select Terminal Settings>Startup Options.



2. Press the On Startup button to select Run Current Application.



   If an application is not loaded, the options are disabled.

3. Press the Replace RSLinx Communications button to specify what configuration settings to use when running the application.
   - Select No to use the RSLinx configuration of the terminal.
   - Select Yes to use the configuration of the application. The terminal configuration is replaced with the application settings. Any changes to device addresses or driver properties in RSLinx communication will be lost.
4. Press the Delete Log Files On Every Power Cycle button to specify what action to take with the log files on startup.
   - Select Yes to delete all log files (data, alarm history, alarm status) generated by the terminal before running application. The files are deleted from the system default location.
   - Select No to retain all log files.
5. Press OK twice to return to Terminal Settings.

Desktop Access

You can allow or restrict access to the Windows desktop on all PanelView Plus 6 terminals. From the desktop, you can perform system and control panel operations, or run third-party applications. Terminals with extended features can additionally run viewers, media players, and launch the web browser. You can even allow access temporarily to perform specific tasks, then disable desktop access to prevent unauthorized changes.

Typically, a terminal does not allow desktop access unless it has extended features.

TIP All terminals are shipped from factory with desktop access disabled.

With restricted access, the only way to access the desktop is to first enter a password. The terminals are shipped from the factory with a default password and challenge question that we recommend you change.

- Default password = password (case sensitive)
- Default challenge question = What is the opposite of lock?
- Default challenge answer = unlock (case sensitive)

When desktop access is set to allow, you can access the desktop by pressing the Exit button from FactoryTalk View ME Station, Configuration mode.

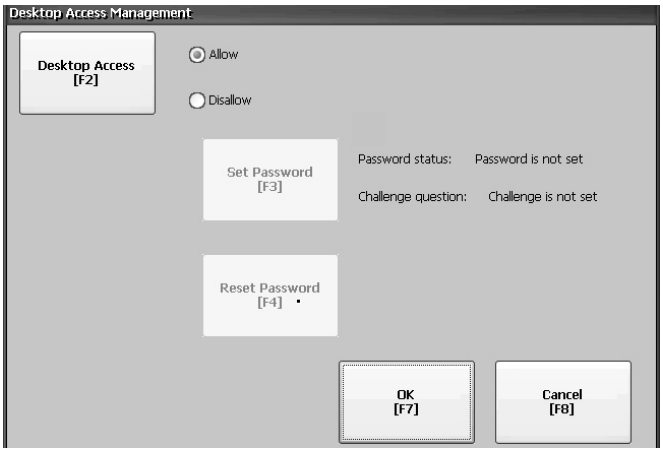
Enable Desktop Access

Follow these steps to enable desktop access.

1. Select Terminal Settings>Desktop Access Setup.
2. Press the Desktop Access button to select Allow.

   The Enter Password dialog box appears.

   TIP Each time you change access from disallow to allow, you are required to enter a password. The initial default password is 'password'.
3. Press the Password button to enter the password and press Enter.
4. Press Enter again to return to Desktop Access Management.



Notice that the password has been cleared.

5. Press OK to exit Desktop Access Management, then Close to exit Terminal Settings.
6. Press Exit from FactoryTalk View ME Station to access the desktop.

   With desktop access set to allow, you will not be required to enter a password.

Disable Desktop Access

To restrict desktop access, the FactoryTalk View ME Station startup option must be set to one of these options:

- Go to Configuration Mode (this is the default)
- Run Current Application

See page 48 for details on how to change the startup option.

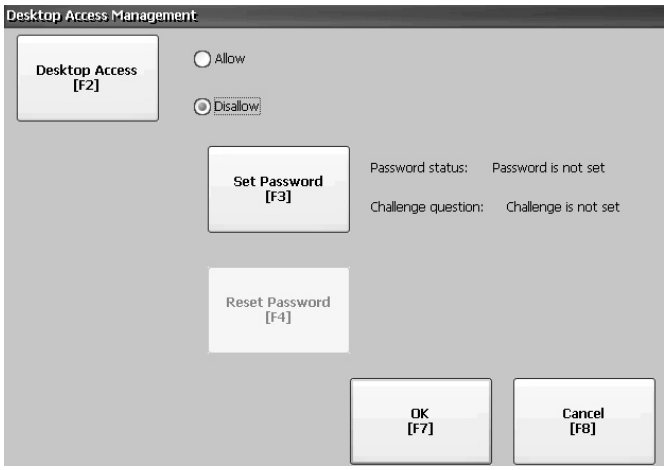
You will also be required to enter a password and challenge question:

- The password is required to access the desktop from FactoryTalk View ME Station when pressing the Exit button.
- The challenge question and response will be required to change the password with the Reset Password function.

Follow these steps to disable desktop access.

1. Select Terminal Settings>Desktop Access Setup.
2. Press the Desktop Access button to select Disallow.

   The Set Password button is enabled.



TIP If you did not appropriately change the startup option, you will get an error.

3. Refer to Set a Desktop Password on page 54 to set a password and challenge question.

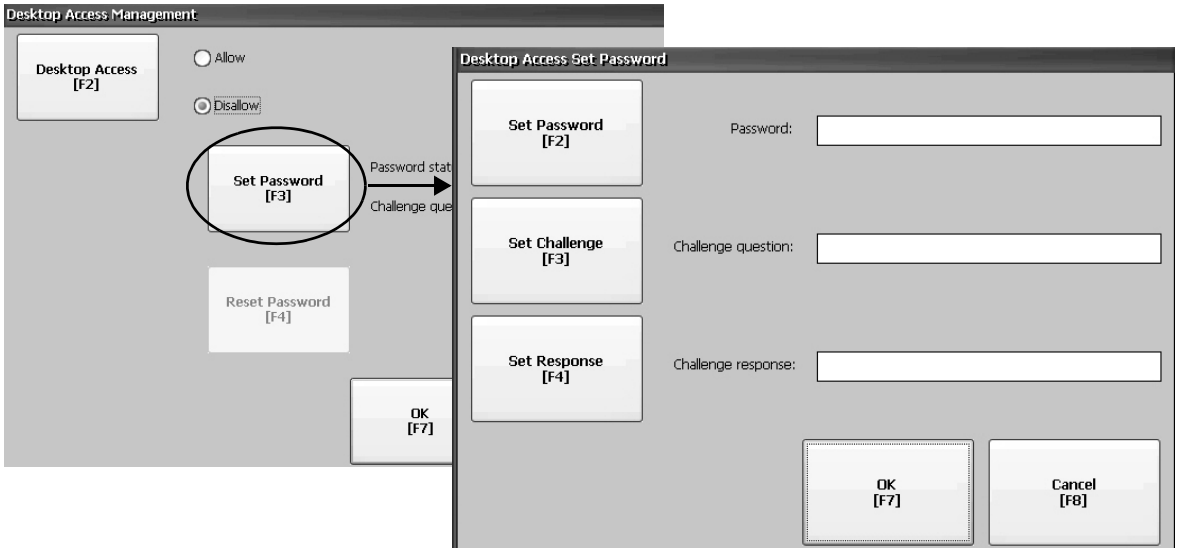
   You must set a password and challenge question when disabling desktop access or you will get an error message.

Set a Desktop Password

IMPORTANT If you disallow or restrict access to the desktop, you will be required to set a password along with a challenge question.

Follow these steps to set a new password.

1. Press the Set Password button from Desktop Access Management.



2. Press the Set Password button and enter an 8...20 character password, then press Enter.

   TIP You would have to correctly enter this password before accessing the desktop.

3. Press the Set Challenge button and enter a question that you would have to correctly respond to before changing the password with the Reset Password button.
4. Press the Set Response button to enter the response to the challenge question, then press Enter.
5. Press OK.

   The Desktop Access Management dialog box will show that a password and challenge question are set.
6. Press OK to return to Terminal Settings.

IMPORTANT Secure your password and challenge question for future use. To clear and reset the password, you must correctly respond to the challenge question. If you forget the response, the only way to clear the password is to restore the factory default settings on the terminal. Refer to Access Maintenance Operations on page 169 for details on how to restore factory defaults.

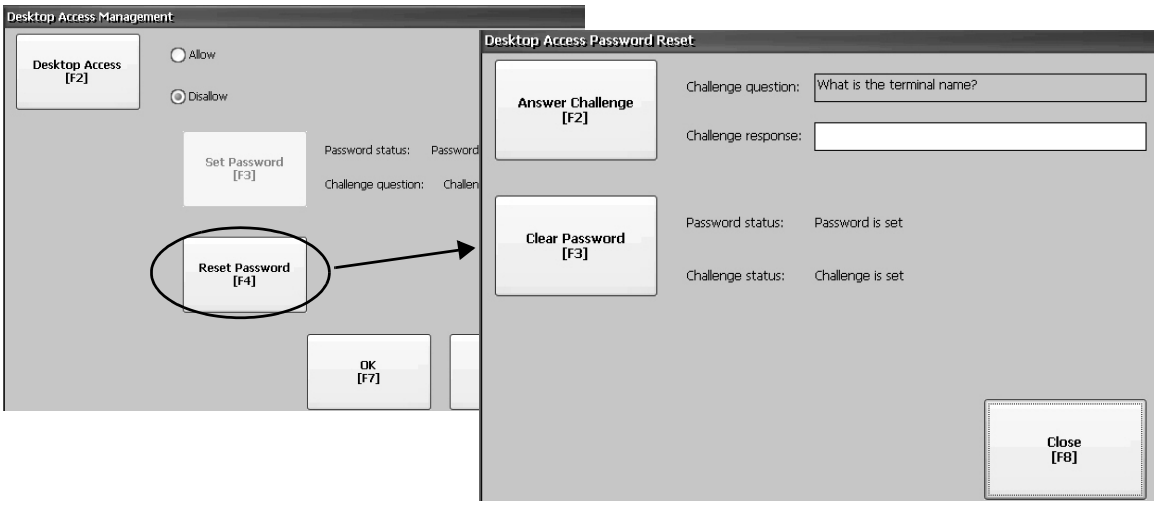
Reset the Desktop Password

To clear the current password and reset a new password, you must first correctly respond to the current challenge question. If you cannot remember the response, you will have to restore the terminal to its factory default settings. Refer to Access Maintenance Operations on page 169 for details.

IMPORTANT You can clear and reset the password and challenge question if access to the desktop is restricted or set to disallow.

Follow these steps to reset a desktop access password.

1. Press the Reset Password button from Desktop Access Management.



2. Press the Answer Challenge button and enter the correct response to the current challenge question.
3. Press the Clear Password button to clear the current password and challenge question.

   The status of the password and challenge information is updated.

   Password status: Password is not set
   Challenge status: Challenge is not set
4. Press the Close button.
5. Follow the Set a Desktop Password procedure on page 54 to set a new password and challenge question.

Communication Setup

You configure communication for your application and controller by using RSLinx Enterprise software:

- Access KEPServer Serial Port ID's.
- Edit the driver settings for the protocol used by your .mer application.
- Edit the device address of the controller on the network.

Configure KEPServer Serial Port ID's

To access KEPServer serial communication, you must have KEPServer Enterprise installed on your terminal. If you plan on using KEPServer Enterprise and serial communication, you must specify which COM port to use.

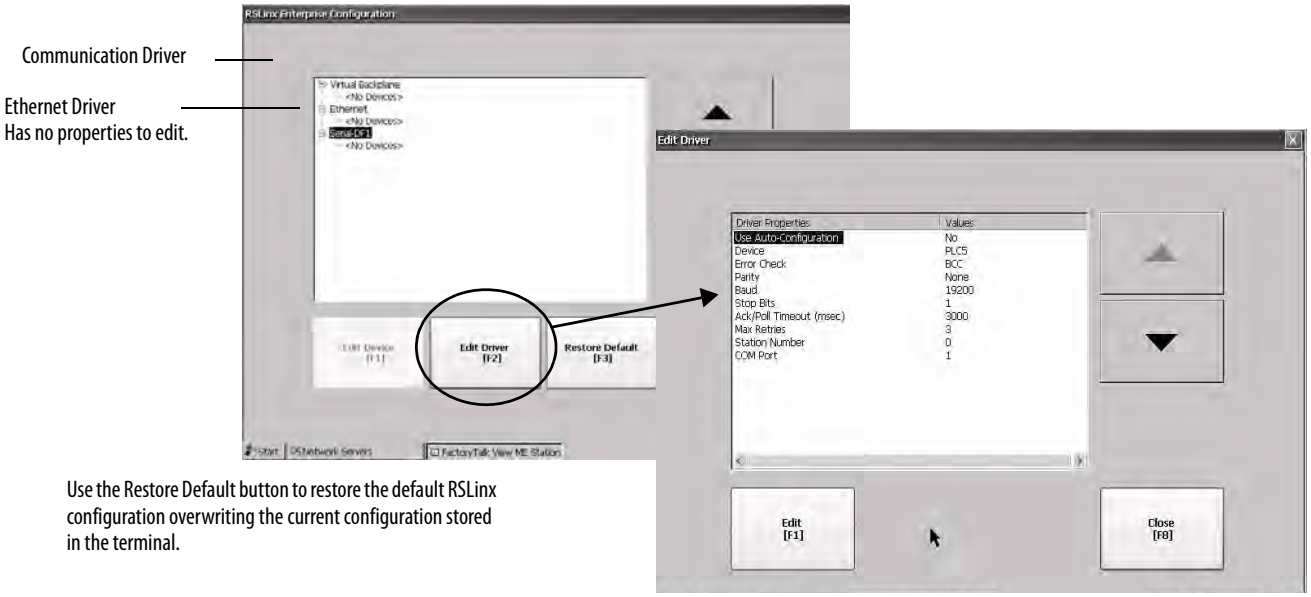
To access the KEPServer Serial Port ID dialog box, select Terminal Settings>Networks and Communications>KEPServer Serial Port ID's. If KEPServer Enterprise is not installed, you will get an error message.

Configure RSLinx Communication Properties

Follow these steps to configure driver settings for the communication protocol used by your application.

1. Select Terminal Settings>Networks and Communications>RSLinx Enterprise Communications.

   You will see a tree view of installed cards and network configurations.



Use the Restore Default button to restore the default RSLinx configuration overwriting the current configuration stored in the terminal.

2. Select a communication card installed on your terminal.
3. Press the Edit Driver button to view the current driver properties.
4. Select a property to modify, then press the Edit button.
5. Modify the setting, then press the Enter button.

   You return to the previous dialog box with the newly entered data.

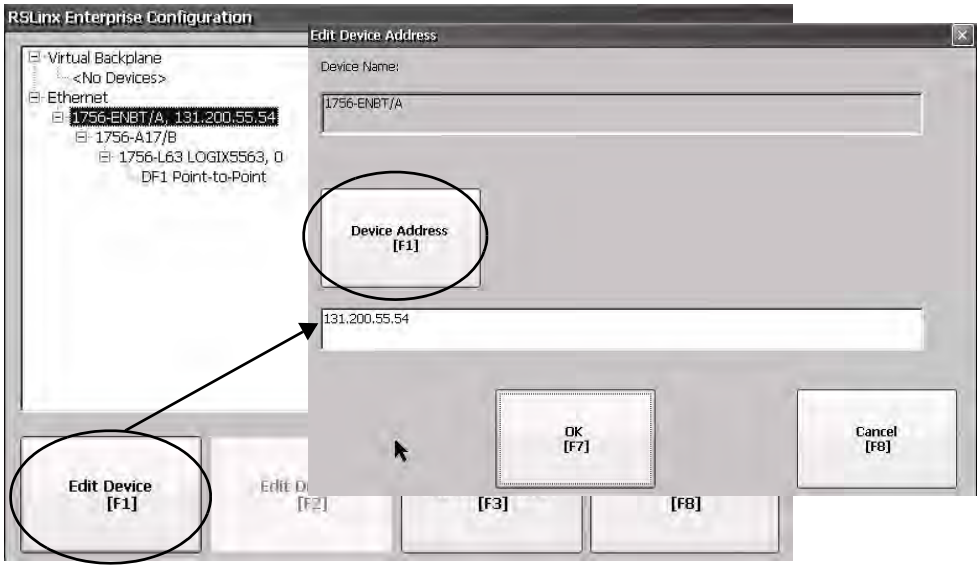
Table 32 - Communication Driver Properties

Field	Description	Valid Values
Serial Properties		
Use Auto Config	Automatically or manually configures the baud rate, parity, and error checking parameters.	Yes (auto configure) No (manual configure)
Device	The serial device terminal is connected to.	PLC-5®, SLC™, MicroLogix™, Logix Platform
Error Check	Type of error checking used. Error checking is automatically configured if Use Auto Config is set to Yes.	BCC, CRC
Parity	Type of parity used. Parity is automatically configured if Use Auto Config is set to Yes.	None, Odd, Even
Baud Rate	Data rate at which serial driver communicates. The baud rate is automatically configured if Use Auto Config is set to Yes.	110, 300, 600, 1200, 4800, 9600, 19200, 38400, 57600, 115200
Stop Bits	Number of stop bits used.	1 or 2
Ack/Poll Timeout	Ack/Poll timeout value in ms.	20…60,000 ms
Max Retries	Number of retries before serial driver fails.	0…10
Station Number	Station number based on a specific device.	0…254
COM Port	Communication port used on the terminal.	1…4
DHPlus Properties		
Jumper ID	Identifies the communication card if multiple cards are installed on terminal.	0…3
Station Number	The unique address of terminal on the DHPlus network.	0…77 (octal)
Baud Rate	The communication rate of the DHPlus network.	57,600 (default) 115,200 230,400
DH-485 Properties		
Jumper ID	Identifies the communication card if multiple cards are installed on terminal.	0…3
Station Number	The unique station number of the terminal on the DH-485 network.	0…31 (decimal)
Baud Rate	The communication rate of the DH-485 network.	9600 19,200
MaxStationNumber	The maximum station number on the DH-485 network. The value must be greater than or equal to the Station Number.	0…31 (decimal)
ControlNet Properties		
Device ID	Unique address of the PanelView Plus 6 terminal on the ControlNet network.	1…99

Configure a Device Address

Follow these steps to edit the address of a device such as a logic controller.

1. From the RSLinx Configuration dialog box, select a device node.
2. Press the Edit Device button to view the device name and current address.



3. Press the Device Address button to modify the address.

   The input panel opens with the current address.
4. Use the Input Panel to modify the address and then press the Enter button.

   You return to the previous dialog box with the new address.
5. Press OK.

IMPORTANT Modified settings do not take effect until the terminal is restarted.

Ethernet Network Connections

The terminal has a built-in Ethernet driver. You can configure this Ethernet information for your terminal:

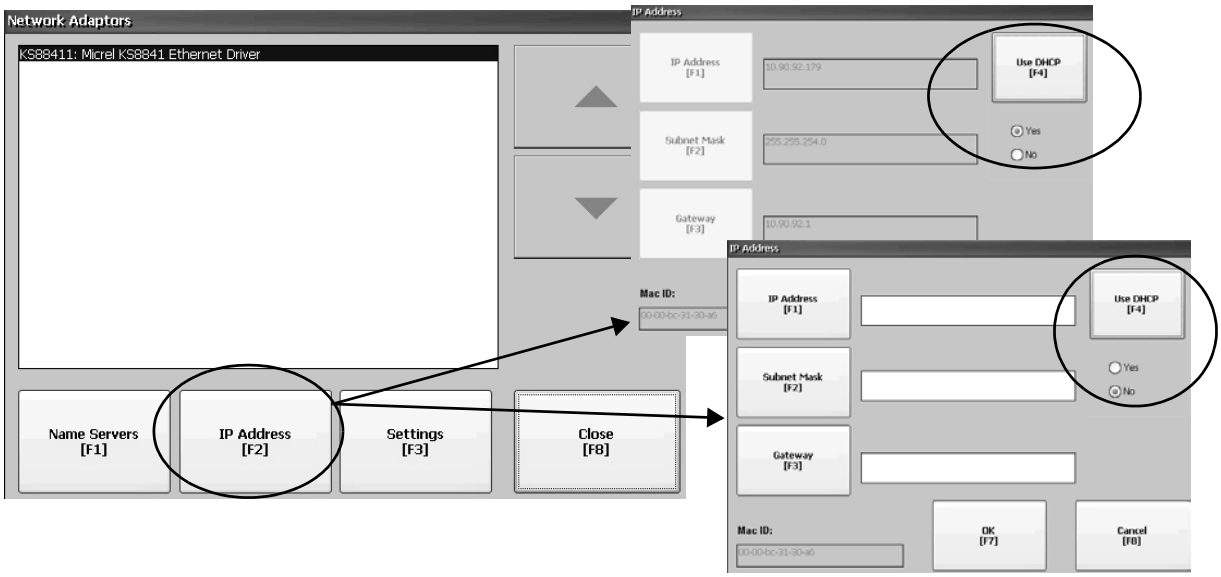
- IP address of terminal on network including link speed
- Device name to identify terminal on network
- Username and password to access network resources

Set the Ethernet IP Address for the Terminal

Some networks automatically assign IP addresses to Ethernet devices if DHCP is enabled. If DHCP is not enabled, you can manually enter an IP address for your terminal.

Follow these steps to view or enter the IP address of your terminal.

1. Select Terminal Settings>Networks and Communications>Network Connections>Network Adapters.



2. Press the IP Address button to view or modify the IP address.
3. Press the DHCP button to enable or disable DHCP assignment of addresses.
   - If DHCP is enabled or set to Yes, IP address are automatically assigned.
   - If DHCP is disabled, you can manually enter IP address. Press the IP address, Subnet Mask, and Gateway buttons to enter IP formatted addresses.
4. Press OK when done.

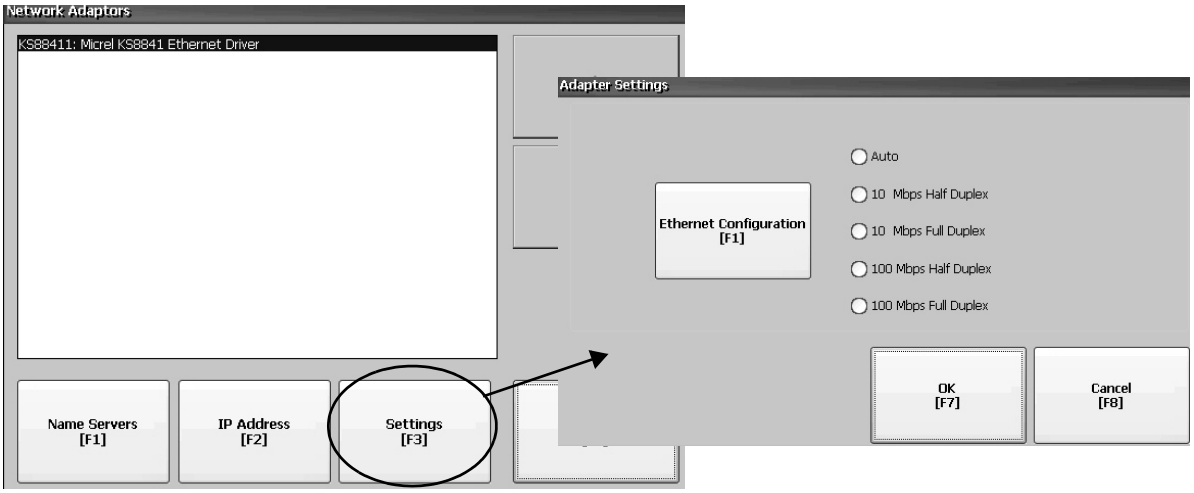
   You may be prompted to reset the device from the FactoryTalk View Station Configuration mode dialog box.
5. Press Close.

Field	Description	Valid Values
Use DHCP	Enables or disables Dynamic Host Configuration Protocol (DHCP) settings. DHCP automatically allocates network devices and configurations to newly attached devices on the network. • If DHCP is set to Yes, the terminal is automatically assigned an IP address, Subnet Mask, and Gateway. The fields are disabled. • If DHCP is set to No, you can enter the IP address, Subnet Mask, and Gateway address.	Yes (default) No
IP Address	A unique address identifying the terminal on the Ethernet network.	xxx.xxx.xxx.xxx 000.000.000.000 (default) • Range of values for the first set of decimal numbers is 1…255 unless all fields are set to 000. • The range of values for the last three sets of decimal numbers is 0…255.
Subnet Mask	Address must be identical to the server subnet mask.	xxx.xxx.xxx.xxx
Gateway	Optional Gateway address.	xxx.xxx.xxx.xxx
Mac ID	Read-only field.	

Set the Ethernet Link Speed

You can set the speed and duplex setting of the Ethernet link.

1. Select Terminal Settings>Networks and Communications>Network Connections>Network Adapters.

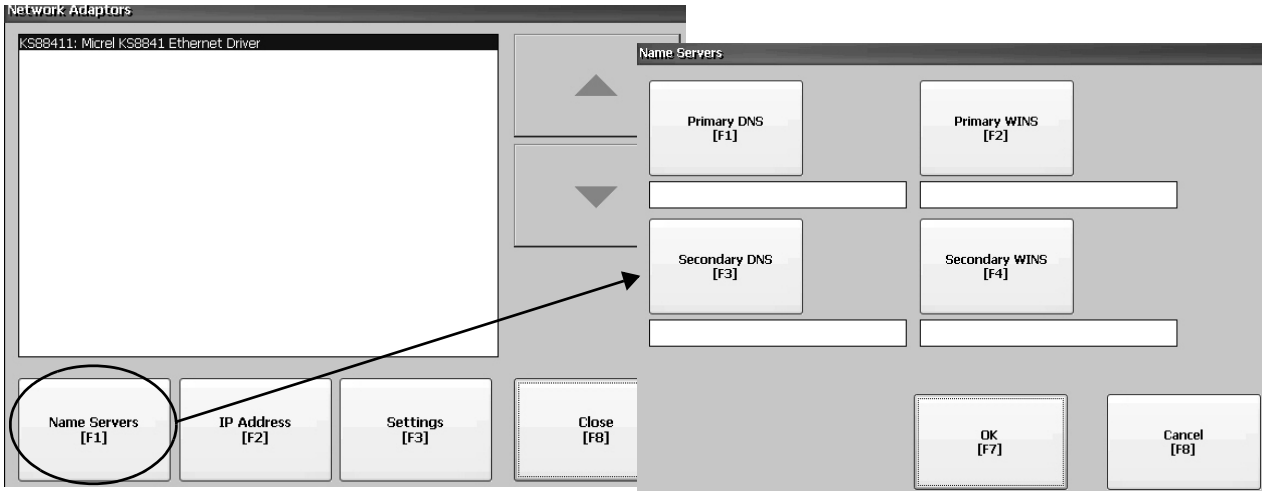


2. Press the Settings button to view or modify the Ethernet link settings.
3. Press the Ethernet Configuration button to select an Ethernet link option for your Ethernet connection.

   The default setting of Auto will automatically sense the link option and speed based on the terminal connection to a network.

Define Name Server Addresses

You can define name server addresses for the EtherNet/IP network adapter. These addresses are automatically assigned if DHCP is enabled for the adapter.



Follow these steps to define a name server address.

1. Select Terminal Settings>Networks and Communications>Network Connections>Network Adapters.
2. Press a button to enter a name server address.

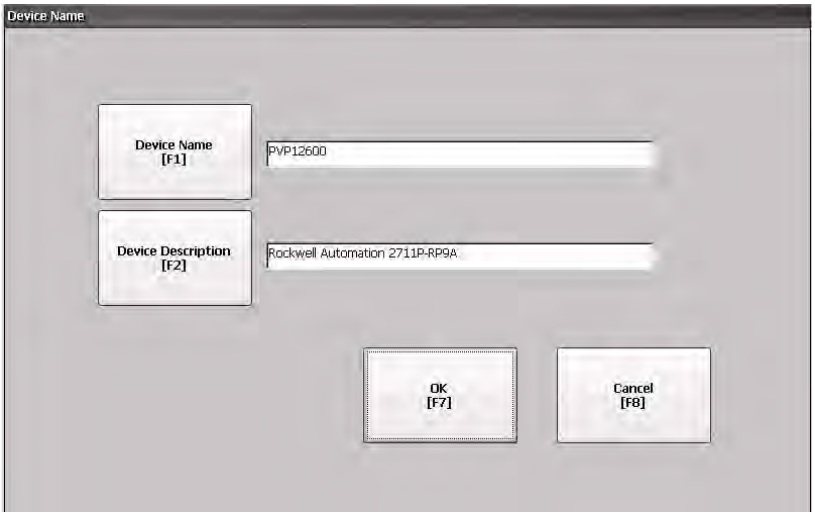
Field	Description	Valid Values
Primary DNS	The address of the primary DNS resolver.	xxx.xxx.xxx.xxx
Secondary DNS	The address of the secondary DNS resolver.	xxx.xxx.xxx.xxx
Primary WINS	The address of the primary WINS resolver.	xxx.xxx.xxx.xxx
Secondary WINS	The address of the secondary WINS resolver.	xxx.xxx.xxx.xxx

3. Press OK when done.

View or Change Terminal Device Name

Each terminal has a default device name and description that is used to identify the terminal on the network. You can view or modify this information.

1. Select Terminal Settings>Networks and Communications>Network Connections>Device Name.



2. Press the Device Name button to enter or edit the device name.
3. Press the Device Description button to enter a description for the device.

Field	Description	Valid Values
Device Name (1)	Unique name that identifies the terminal to other computers on the network.	1…15 characters • A leading character in the range of a through z or A through Z. • Remaining characters in the range of a through z, A through Z, 0…9, or - (hyphen)
Device Description	Provides a description of the terminal. The default is the logic module catalog number.	50 characters max

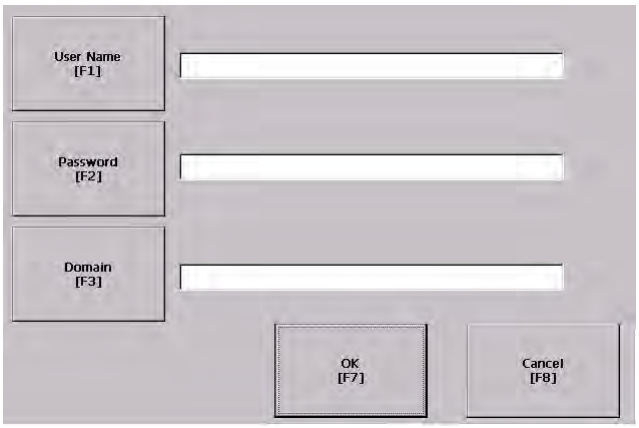
(1) Check with your network administrator to determine a valid device name.

4. Press OK.

Authorize Terminal to Access Network Resources

The terminal can access network resources with proper identification. A user name, password, and domain must be provided by your network administrator.

1. Select Terminal Settings>Network and Communications>Network Connections>Network Identification.



2. Press the user name, password and domain buttons and enter the information provided by your network administrator.

Field	Description	Valid Values
User Name	Identifies the user to the network.	70 characters max
Password	Characters that gain access to network along with the user name.	No character limitation
Domain Name	Provided by network administrator.	15 characters max

3. Press OK when done.

File Management

The terminal supports operations for managing files that are stored on the terminal:

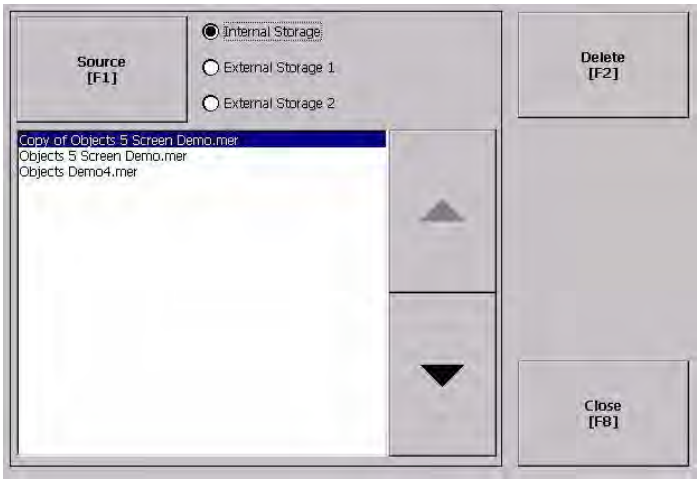
- Deleting application .mer files, font files, or generated log files
- Copying application files or font files between storage locations

Delete Application File or Font File

You can delete FactoryTalk View ME .mer files or font files that reside in the nonvolatile memory of the terminal, a loaded USB flash drive, or a loaded SD card. The procedure for deleting an application file or a font file is the same.

1. Select Terminal Settings>File Management>Delete Files>Delete Applications or Delete Fonts.

2. Press the Source button to choose the storage location of the application or font file you want to delete.
   - Internal Storage - nonvolatile memory of the terminal
   - External Storage 1 - SD card loaded in the card slot of the terminal
   - External Storage 2 - USB flash drive connected to a USB host port



3. Select a file from the list.
4. Press the Delete button.
5. Select Yes or No when asked if you want to delete the selected application or font file from the storage location.

Delete Log Files

You can delete generated log files, alarm history files, and alarm status files from the System Default location on the terminal.

1. Select Terminal Settings>File Management>Delete Files>Delete Log Files.

   You are asked to confirm the deletion of the files.

   Do you want to delete all of the FactoryTalk View ME Station Log Files?

2. Select Yes or No.

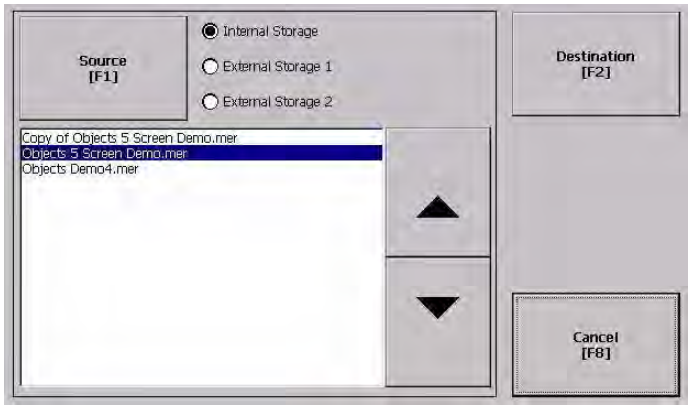
   Log files not located in the System Default location will not be deleted.

Copy Application File or Font File

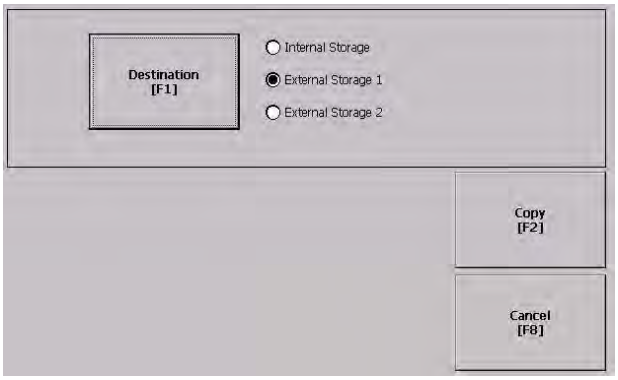
You can copy Factory Talk View application .mer files or font files from one storage location to another in the terminal. The procedure for copying an application file or a font file between storage locations is the same.

1. Select Terminal Settings>File Management>Copy Files>Copy Applications or Copy Fonts.

List of files stored in nonvolatile memory of terminal.



2. Press the Source button to choose the location of the file you want to copy.
   - Internal Storage - nonvolatile memory of the terminal
   - External Storage 1 - SD card loaded in the card slot of the terminal
   - External Storage 2 - USB flash drive connected to a USB host port
3. Select a file from the storage location.
4. Press the Destination button on the same dialog box.



5. Press the Destination button to choose the location to copy the file. The destination must be different than the source location.
6. Press the Copy button to copy the selected file to the destination. If the file exists, you will be asked if you want to overwrite the file.
7. Select Yes or No.

TIP FactoryTalk View ME Station software looks for .mer files in the My Device\Application Data\Rockwell Software\RSViewME\Runtime\ folder and font files in the \Rockwell Software\RSViewME\Fonts\ folder.

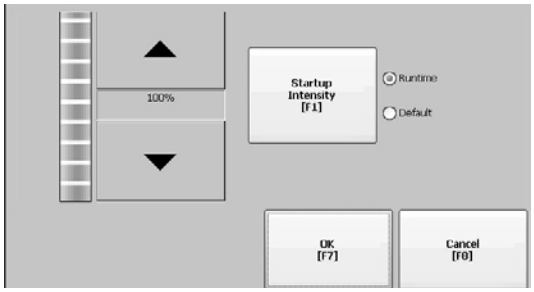
Display Settings

For the terminal display, you can adjust its intensity, view its temperature, configure the screen saver, or enable/disable the screen cursor.

Adjust the Display Intensity

You can modify the intensity of the terminal backlight. You can use the default intensity of 100% or you can change the intensity for runtime operations.

1. Select Terminal Settings>Display>Display Intensity.



2. Press the Startup Intensity button to switch between the Default intensity and the Runtime intensity.
   - If you choose Runtime, the startup screens use the runtime intensity.
   - If you choose Default, the startup screens use the default setting, 100%
3. Increase or decrease the intensity for runtime operations, by pressing the up or down arrow keys.
4. Press OK when done to save the intensity changes.

View the Display Temperature

To view the current temperature of the display, select Terminal Settings>Display>Display Temperature.

The terminals have a cold-cathode fluorescent lamp (CCFL) backlight. This backlight requires temperature control when the internal temperature of the product is below 10 °C (50 °F) or above 60 °C (140 °F). The terminal monitors low and high temperature conditions. If the internal temperature is:

- Below 10 °C (50 °F), the backlight is set to overdrive or the full-rated current setting for at least five minutes.
- Above 60 °C (50 °F), the backlight is set to underdrive; 40% or less of full brightness. This reduces heat generation from the backlight.

Temperature monitoring begins when the backlight turns on at startup or when the screen saver is deactivated. The temperature control affects only display intensity; it does not restrict the use or operation of the terminal.

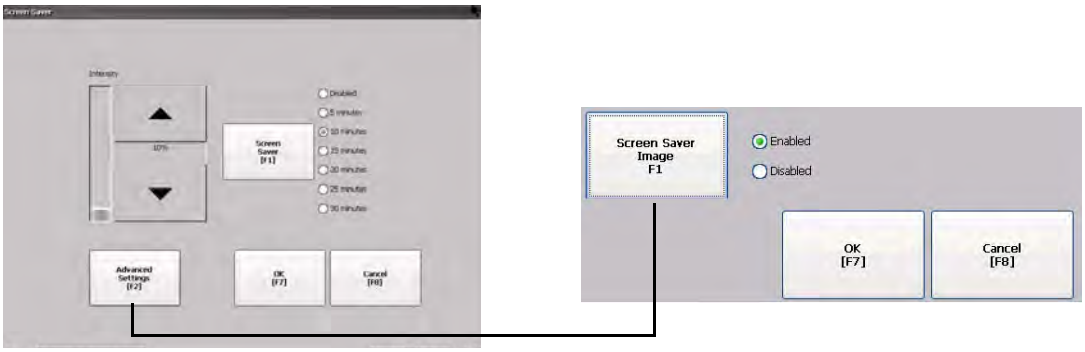
When a low or high temperature condition is detected, an error is sent to the system event log. If the temperature control is not functioning, a noncritical error is sent to the system event log but the terminal continues to operate normally.

TIP The CCFL backlight temperature control takes precedence over the application backlight settings.

Configure the Screen Saver

The screen saver on the terminal activates after an idle period using a specific intensity. The default idle timeout is 10 minutes. You can adjust the idle timeout and intensity level for the screen saver, disable the screen saver, and enable or disable the screen saver bitmap.

1. Select Terminal Settings>Display>Screen Saver.

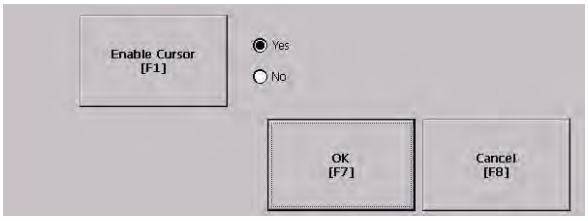


2. Press the Screen Saver button to select an idle timeout for activating the screen saver.
   To disable the screen saver, select the Disabled option.
3. Increase or decrease the brightness intensity of the screen saver by pressing the up and down cursor buttons.
4. Press the Advanced Settings button to access the bitmap option.
   - Select the Screen Saver Image button to enable or disable the screen saver bitmap.
   - Press OK to return to the previous.
5. Press OK to exit and return to the terminal settings.

Enable or Disable the Screen Cursor

The terminal has a screen cursor that you can enable or disable.

1. Select Terminal Settings>Display>Cursor.



2. Press the Enable Cursor button to enable or disable the cursor.
3. Press OK to exit and return to Terminal Settings.

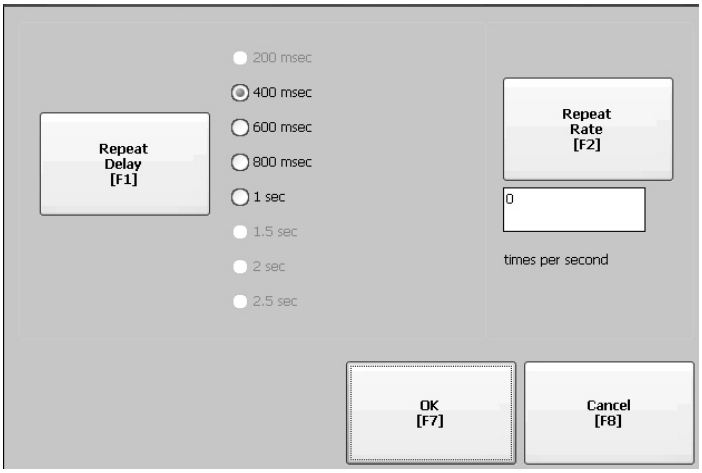
Input Device Settings

You can adjust the settings for input devices used by the terminal including the keypad, attached keyboard, mouse, touch screen, and string entry popup.

Configure Keyboard or Keypad Settings

You can adjust settings for keys on an attached keyboard or the terminal keypad.

1. Select Terminal Settings>Input Devices>Keyboard/Keypad.



2. Press the Repeat Rate button to specify the number of times a key is repeated per second when you hold a key down.

   Valid values for the keypad are 0 and 2...30. The keyboard is device dependent but typical values are the same.

3. Press the Repeat Delay button to select the amount of time that elapses per second before a key is repeated.

   Values are device dependent. Unsupported values are dimmed.

4. Press OK when done.

Set the Sensitivity of the Mouse

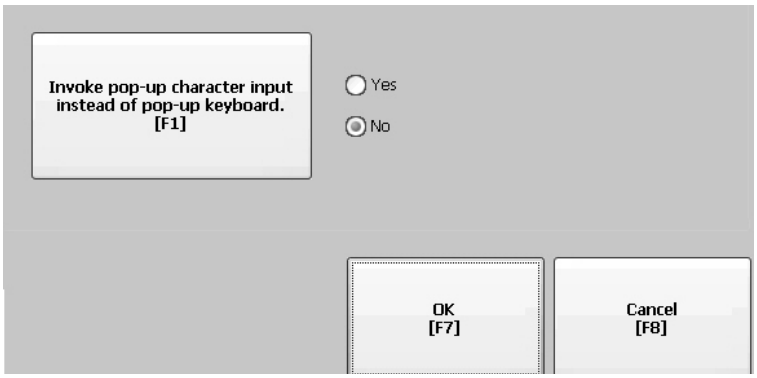
You can set and test the sensitivity for both the speed and physical distance between mouse clicks. The process is identical to setting the double-tap sensitivity for the touch screen. See page 69.

To set the mouse sensitivity, select Terminal Settings>Input Devices>Mouse.

Change the Popup for String Entry

You can specify whether to use the standard input panel for data entry or a string popup. The popup keyboard is the default.

1. Select Terminal Settings>Input Devices>Keypad>String Popup.



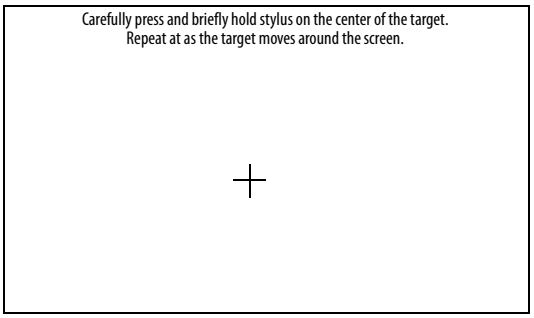
2. Press the Invoke pop-up character input instead of popup keyboard button to select the preferred input method for string entry.
3. Press OK.

Calibrate a Touch Screen

Follow these steps to calibrate the touch screen.

IMPORTANT Use a plastic stylus device with a minimum tip radius of 1.3 mm (0.051 in.) to prevent damage to the touch screen.

1. Select Terminal Settings>Input Devices>Touch Screen>Calibration.



2. Follow the instructions on the screen.

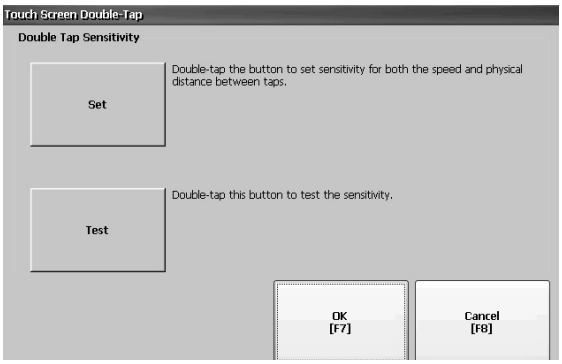
   When the calibration is complete, you will see a message that indicates new calibration settings have been measured.

On Touch screens	• Tap the screen to register saved data. • Wait for 30 seconds to cancel saved data and keep the current settings.
On Keypad terminals	• Press the Enter key to accept new settings • Press the Esc key to keep old settings.

Set Double-tap Sensitivity for a Touch Screen

You can set and test the sensitivity for both the speed and physical distance between touch-screen presses. The process is identical to setting the double-tap sensitivity for the mouse.

1. Select Terminal Settings>Input Devices>Touch Screen>Double Tap Sensitivity.



2. Double-tap the Set button to set the sensitivity of touch-screen presses.
3. Double-tap the Test button to test the sensitivity of touch-screen presses. If you double-tap the test button with the time set using the Set button, the Test button will reverse its foreground and background colors.
4. Press OK when done.

Configure Print Options

You can configure settings for printing displays, alarm messages, or diagnostic messages from FactoryTalk View ME .mer applications. The general setup for printing displays and messages is the same, however, the advanced settings are different.

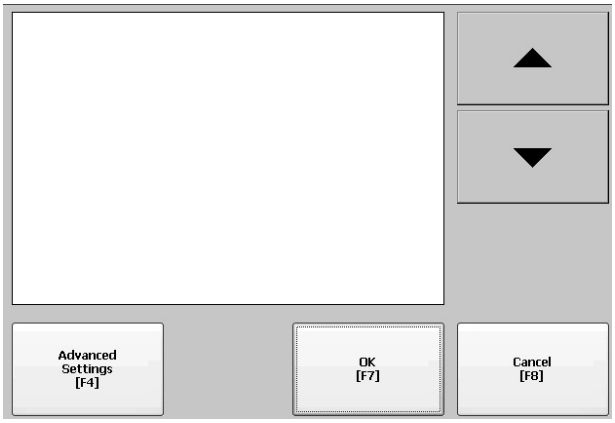
PanelView Plus 6 terminals are shipped with support for a large selection of Canon, Epson, Hewlett-Packard, and Brother Printers. Printer installation will attempt to use USB Plug-and-Play capabilities to the extent that known printers are mapped automatically to the appropriate driver. The printing solution allows applications and users to select, manage, and share printers without knowing the underlying details of the printer. Printers that do not configure automatically to the appropriate driver can be installed manually.

Follow these steps to access the print setup.

1. Select a Terminal Settings>Print Setup> option.
   - Alarm Print Setup
   - Diagnostic Setup
   - Display Print Setup

   Print Setup displays installed printers that are available to the FactoryTalk View Machine Edition application.

   The terminals are not shipped with pre-configured printers so initially the dialog box appears empty. The appearance of the dialog box will depend on what printers you install.



2. Select an installed printer.

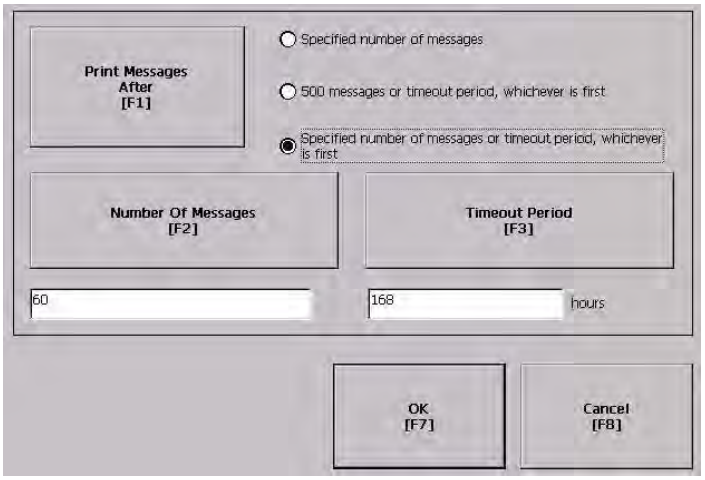
   TIP A failed attempt to automatically install a printer will be reported in the system event log.

   A printer that does not install automatically can be installed manually by using the control panel in Windows Explorer.

3. Press the Advanced button to access additional settings.

- The advanced settings for printing displays determine:
  - Print orientation (portrait or landscape).
  - Draft mode (enable or disable).
  - Color (yes or no).

- Advanced settings for printing diagnostic and alarm messages determines when to print messages sent to the network or USB port.



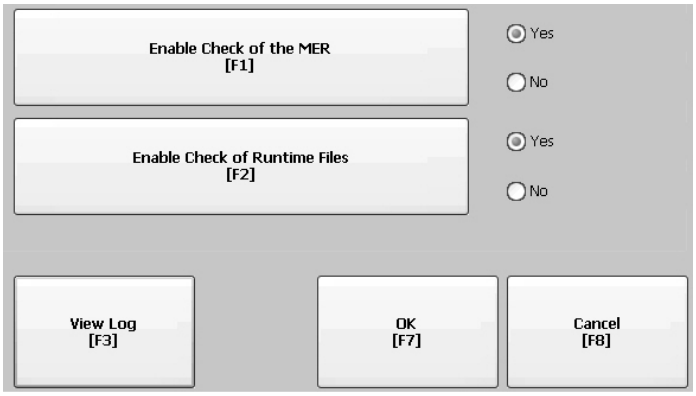
Print Messages After	Default Value	Example
Specified number of messages	60 messages	When the queue has 60 messages, the messages are printed regardless of how long they have been in the queue. You can change the number of messages.
500 messages or timeout period, whichever is first	168 hours (7 days)	If the queue has 350 messages after 168 hours, the 350 messages are printed. You can change the timeout period.
Specified number of messages or timeout period, whichever is first.	60 messages 168 hours (7 days)	If the queue has 60 messages after 24 hours, then the 60 messages are printed. You can change the number of messages and the timeout period. For example, the number of messages is set to 75 and the timeout period is set to 48 hours. •If the queue has 75 messages after 24 hours, then the 75 messages are printed before the set timeout of 48 hours. •If the queue has 15 messages after 48 hours, the 15 messages are printed after the set timeout period.

4. Press OK when done.
5. Press OK to return to Terminal Settings.

Check Integrity of Application Files

It is recommended that you periodically check the integrity of the FactoryTalk View .mer application file that is currently loaded in the terminal and the runtime files. All errors, warnings, and information messages generated by these files are logged to a file. You can periodically view the log and clear all items from the log.

1. Select Terminal Settings>File Integrity Check.

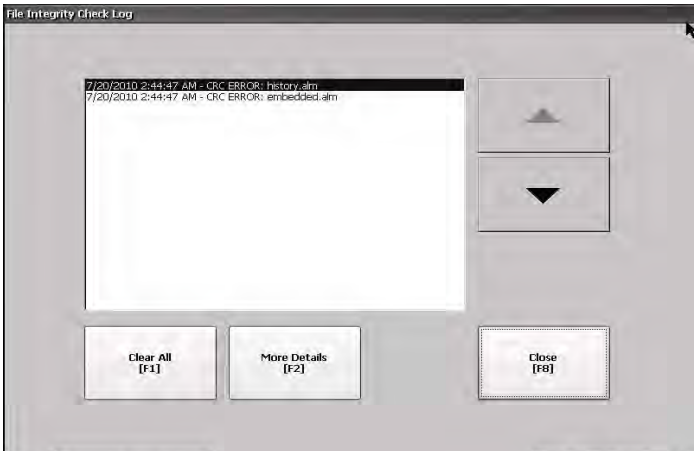


2. Press either of the Enable buttons to enable or disable file integrity checks.
   - Enable Check of the MER
   - Enable Check of the Runtime Files

   By default, integrity checks are automatically performed on the application .mer file and runtime files. If you disable either of these functions, the files will not be checked nor will the log file be updated.
3. Press OK to save changes.

Follow these steps to view the file integrity check log.

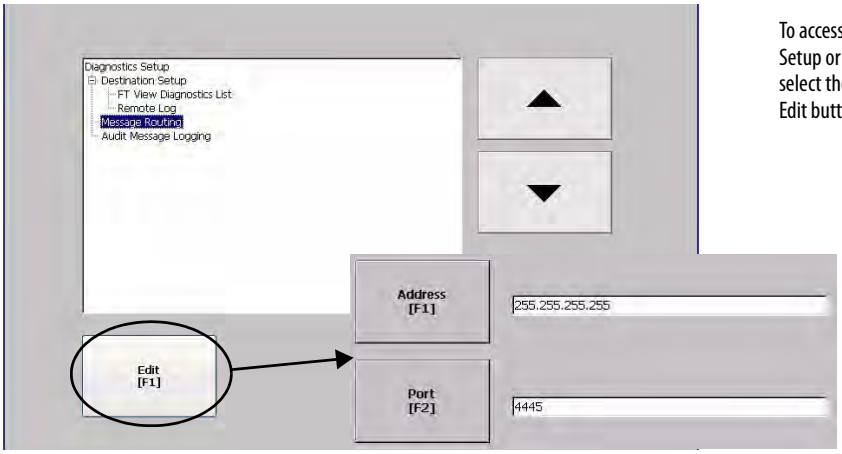
1. Press the View Log button from the File Integrity Check dialog box.



2. Select an event and press the More Details button to display details for a specific file check event.
3. Press the Clear All button to clear all details from the log.
4. Press Close to return to previous dialog box.

Configure Diagnostics

You can configure diagnostics for the current computer. To access diagnostics, select Terminal Settings>Diagnostic Setup from the Configuration Mode dialog box. You will see a tree view of diagnostic nodes.



To access the Remote Log Setup or Message Routing, select the node and then the Edit button.

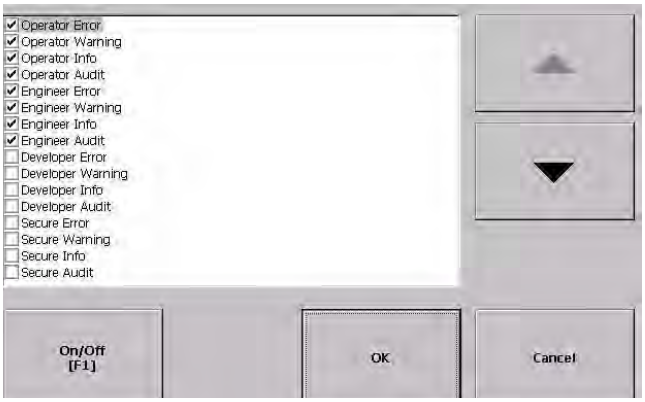
The Remote Log Destination forwards received messages to a Windows computer running diagnostics. The location is determined by the IP address and port number.

Field	Description	Valid Values
Address	Address of the remote Windows computer.	xxx.xxx.xxx.xxx
Port	The port used to communicate with the remote Windows computer.	4445 (default)

The Message Routing dialog box lets you access these dialog boxes:

- Remote Log
- FactoryTalk View Diagnostics List

Each dialog box shows a list of messages that can be sent to that destination. The list shows the status of each message type. Use the On/Off button to turn a message type on or off. A message type is enabled if it has a checked box.

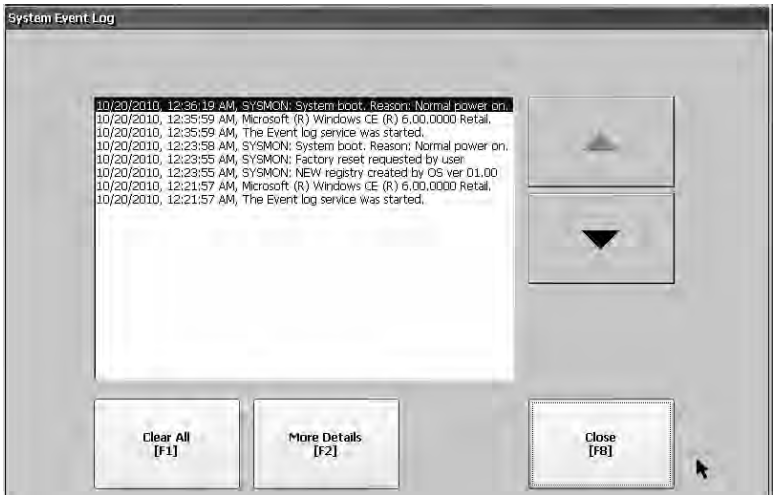


The Audit Message Logging dialog box lets you log messages as Audit or Information when the Edit button is pressed.

View and Clear the System Event Log

The System Event Log dialog box displays a list of warnings, errors, and events logged by the terminal. The log provides a time stamp of when each event occurred and text describing the event. If the event log is full when a new event occurs, the oldest entry is removed to accommodate the new event.

1. Select Terminal Settings>System Event Log.



2. Select an event and press the More Details button to display log details for that event.
3. Press the Clear All button to clear all system event logs.
4. Press Close.

System Information

From Configuration mode, you can view terminal information and firmware revision information for software installed on a terminal. This information may be useful during troubleshooting.

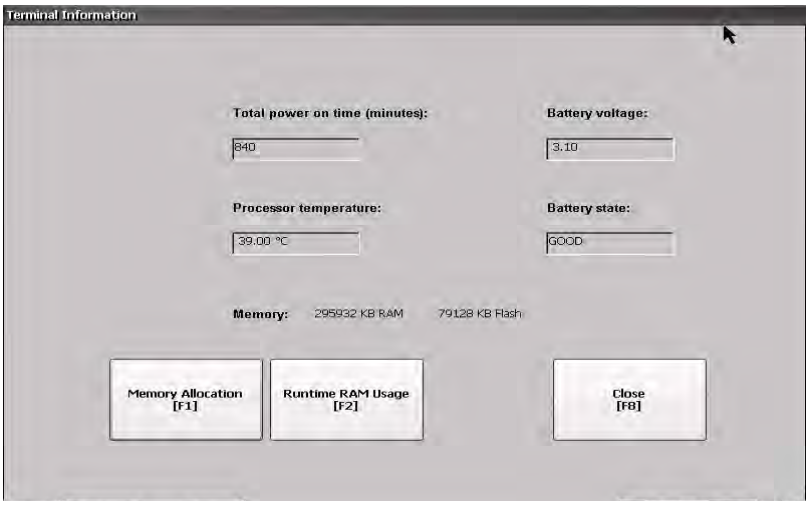
View Terminal Information

The read-only information is provided for the terminal:

- Total power on time in minutes
- Processor temperature
- Battery voltage and battery state
- Memory allocated and used on terminal
- RAM memory used during runtime

Follow these steps to display terminal information.

1. Select Terminal Settings>System Information>Terminal Information.

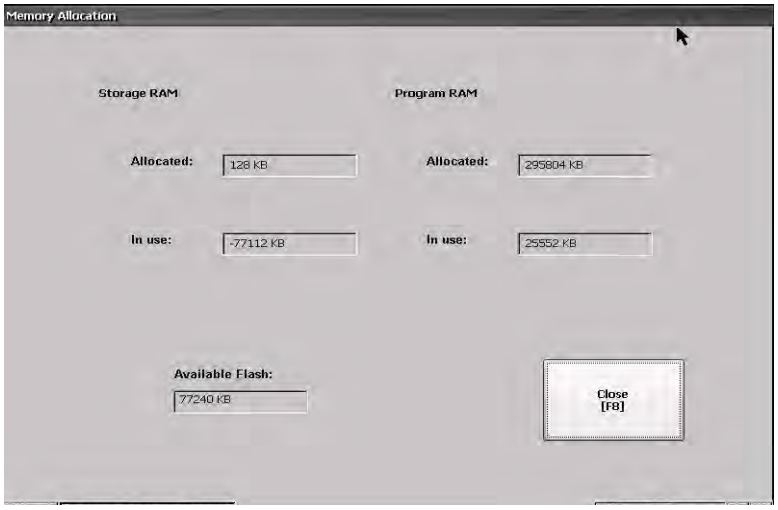


All fields are read-only:

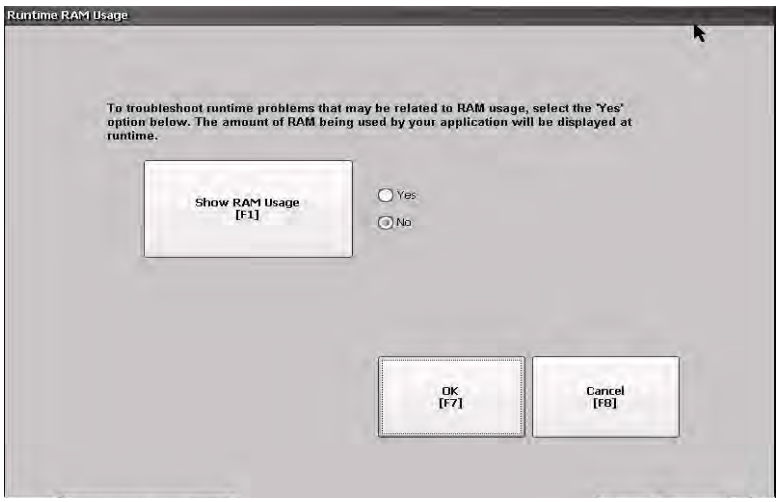
- The CPU temperature should be less than 95 °C (203 °F).
- The battery voltage must be at least 2.75V DC.

Battery State	Description
Good	Good battery condition.
Failing	Low battery. Replace the battery.
Bad	Battery is missing or bad. Replace the battery.

2. Press the Memory Allocation button to view the following.
   - Amount of allocated storage or program memory
   - Amount of storage or program memory in use
   - Amount of available nonvolatile flash memory



3. Press Close to return to previous dialog box.
4. Press the Runtime RAM Usage button to troubleshoot runtime anomalies by showing the amount of RAM used by your application at runtime.

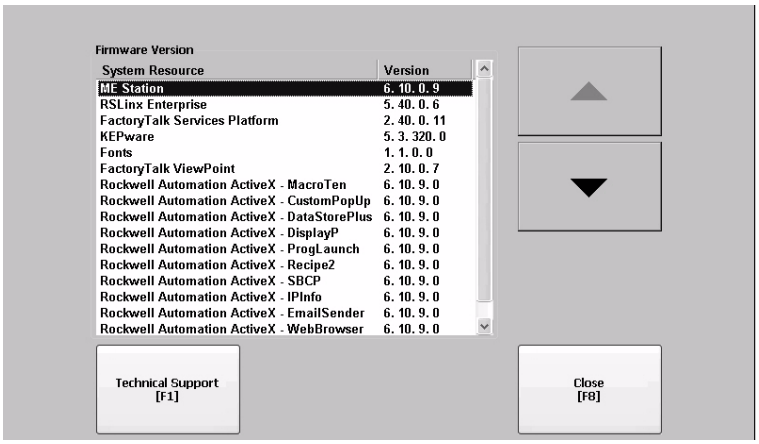


5. Press OK to return to previous dialog box.
6. Press Close until you return to terminal settings.

Display FactoryTalk View ME Station Information

You can display the firmware and version information for installed system components on your terminal and technical support information.

1. Select Terminal Settings>System Information>About FactoryTalk View ME Station.

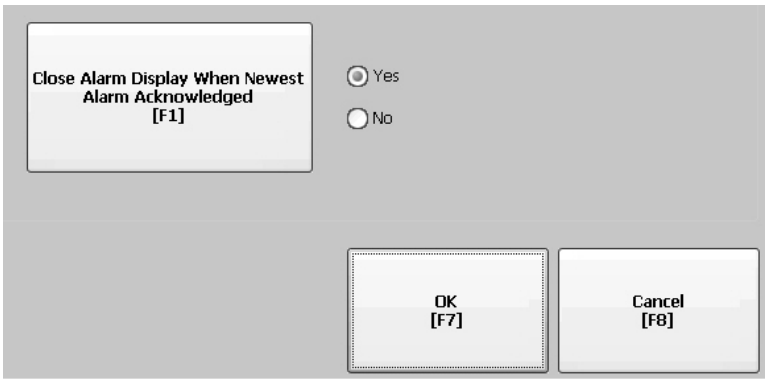


2. Press the Technical Support button to display the support phone number and website for your terminal .
3. Press Close until you return to terminal settings.

Enable or Disable the Alarm Display

Each new alarm that occurs on the terminal is displayed in the alarm display or banner. When the newest alarm is acknowledged by the operator, you can choose to close the alarm display or leave it open. By default the alarm display is closed.

1. Select Terminal Settings>Alarms.



2. Press Yes or No.
   - Yes, the default option, closes the alarm display each time the operator acknowledges the newest alarm.
   - No leaves the alarm display open after the operator acknowledges the newest alarm.
3. Press OK.

Time and Date Settings

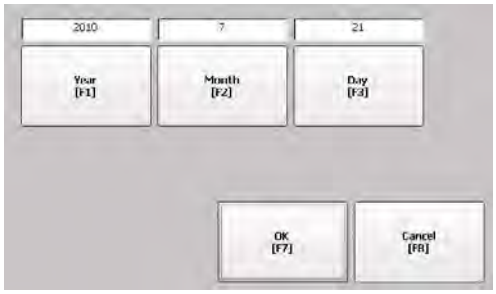
You can change the date, time, time zone, and regional settings for terminal operations.

Change the Date for Terminal Operations

Follow these steps to adjust the date for terminal operations.

1. Select Terminal Settings>Time/Date/Regional Settings>Date.

   The current date appears in the Year, Month, and Day fields.



2. Press the Year, Month, and Day buttons to change the values.

Field	Description	Valid Values
Year	The current year in a four-digit format.	1980…2099
Month	The current month.	1…12
Day	The current day. The day of the month is validated.	0…31

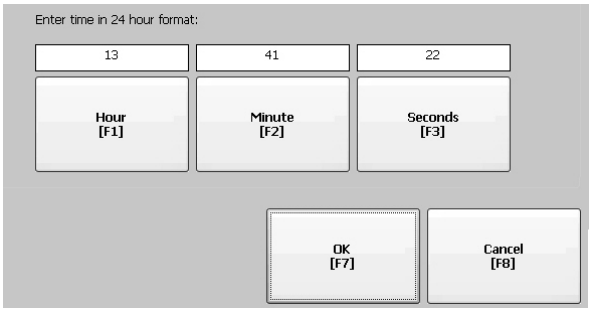
3. Press OK when done.

Change the Time for Terminal Operations

Follow these steps to adjust the time for terminal operations.

1. Select Terminal Settings>Time/Date/Regional Settings>Time.

   The current time appears in 24-hour format in separate Hour, Minute, and Second fields.



2. Press the Hour, Minute, and Seconds buttons to change the values.

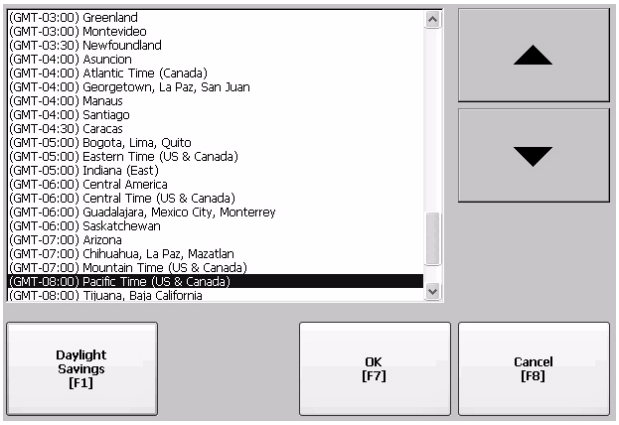
Field	Description	Valid Values
Hour	The current hour in 24-hour format.	0…23
Minute	The current minute in 24-hour format.	0…59
Seconds	The current second in 24-hour format.	0…59

3. Press OK when done.

Change the Time Zone for Terminal Operations

You can view or modify the current time zone that is installed on the terminal. Time zones are installed as a part of the operating system. Changing the time zone adjusts the current time and date to match the new time zone.

1. Select Terminal Settings>Time/Date/Regional Settings>Time Zone.



2. Press the up and down cursor buttons to select a time zone.

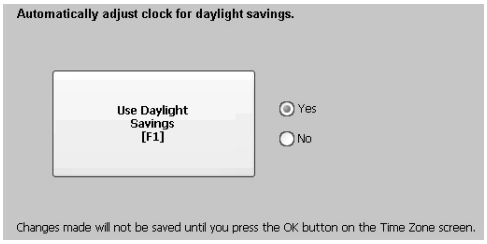
Language	Default Time Zone
English	(GMT -05:00) Eastern Time (US and Canada)
French	(GMT +01:00) Brussels, Copenhagen, Madrid, Paris
German	(GMT +01:00) Amsterdam, Berlin, Bern, Rome, Stockholm, Vienna
Japanese	(GMT +09:00) Osaka, Sapporo, Tokyo

   If the selected time zone supports Daylight Savings, you can press the Daylight Savings button.

3. Press the Daylight Savings button to enable or disable daylight savings for the selected time zone.

   Daylight Savings is set to Yes for all time zones except for Japanese, which does not support daylight savings. Daylight savings changes are not permanently applied until you close the Time Zone dialog box.

4. Press the Use Daylight Savings Button to select Yes or No.



5. Press Close when done.
6. Press OK to return to previous dialog box.

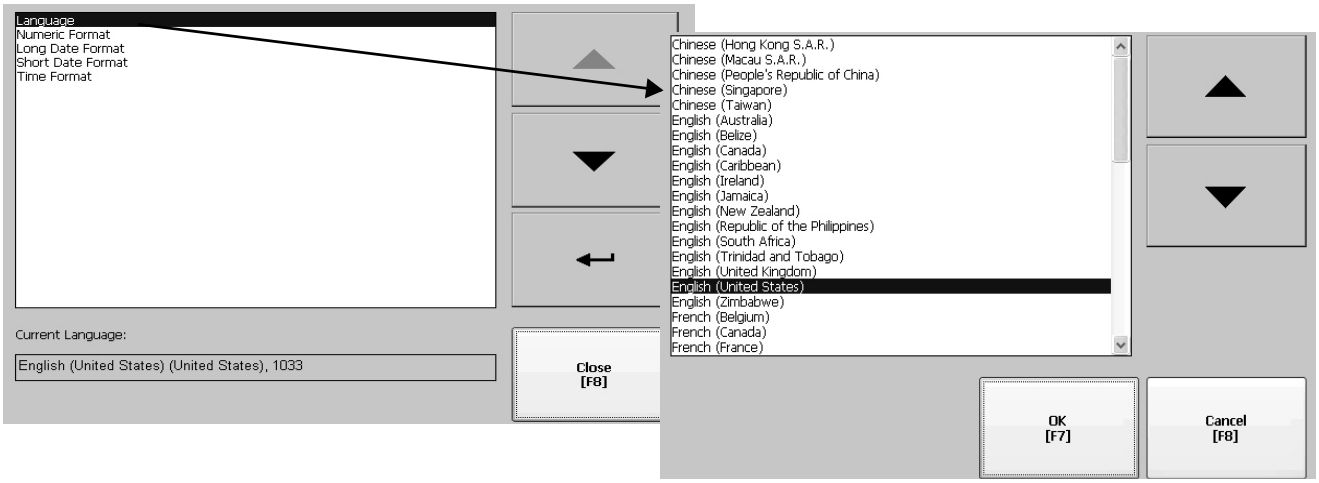
Regional Settings

You can adjust regional settings for a specific language installed on the terminal, including the date, time and numeric formats. Regional settings are accessed by choosing Terminal Settings>Time/Date/Regional Settings>Regional Settings. The current language is shown at the bottom of the Regional Settings dialog.

Select a Language

Before you can modify regional settings for a language, you need to select a language installed on the terminal. Languages are installed as a part of the operating system.

1. Select Terminal Settings>Time/Date/Regional Settings>Regional Settings>Language.

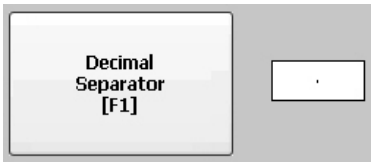


2. Select a language by pressing the up and down cursor keys.
3. Press OK.
   The selected language shows at the bottom of the Regional Settings dialog.

Change the Decimal Separator for Numeric Formats

You can change the decimal separator used in numerics for the current language. The default decimal separator is a period.

1. Select Terminal Settings>Time/Date/Regional Settings>Regional Settings>Numeric Format.

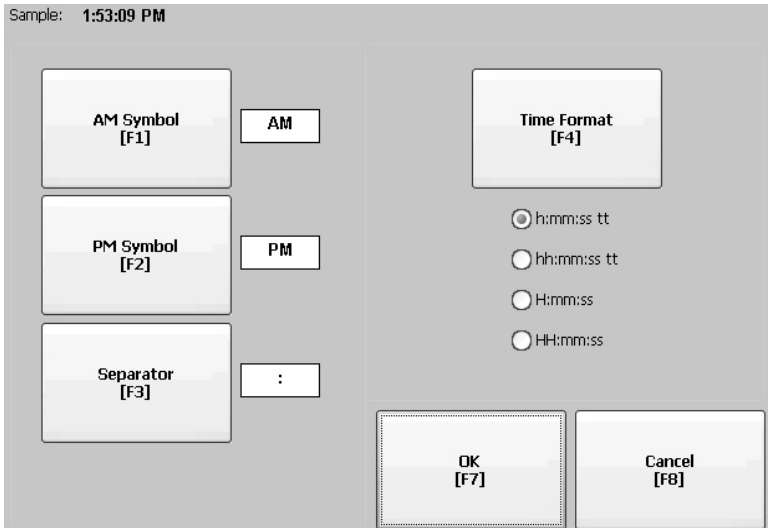


   The field shows the default decimal separator. The field will accept a separator up to three characters.
2. Enter up to three characters for the new separator, then press OK.

Change the Time Format for a Language

Follow these steps to change the time format for the selected language.

1. Select Terminal Settings>Time/Date/Regional Settings>Regional Settings>Time Format.



The current time is shown using the currently selected format.

2. Press the appropriate buttons to adjust the formats.

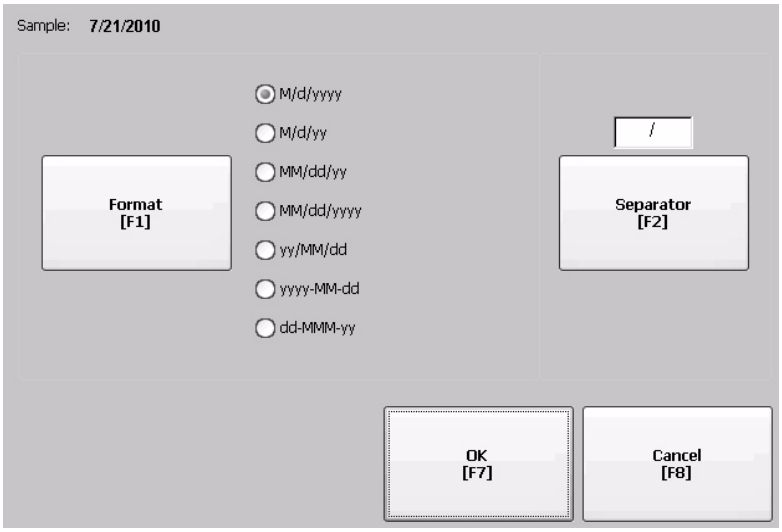
Field	Description	Example
Time Format	h:mm:ss tt (default) h = hour, no leading zero tt = AM or PM symbol	7:23:02 AM or 1:13:31 PM 11:43:59 AM
	hh:mm:ss tt hh = hour with leading zero tt = AM or PM symbol	07:23:02 AM or 01:13:31 PM 11:43:59 PM
	H:mm:ss H = hour in 24-hour format, no leading zero	7:03:42 or 1:13:32 23:43:59
	HH:mm:ss HH = hour in 24-hour format with leading zero	07:03:42 or 01:13:22 23:43:59
AM Symbol	Characters to indicate AM. If the time format is set to h:mm:ss tt or hh:mm:ss tt, you can modify the AM symbol.	AM (default) 12 character max
PM Symbol	Characters to indicate PM. If the time format is set to h:mm:ss tt or hh:mm:ss tt, you can modify the PM symbol.	PM (default) 12 character max
Separator	Characters that separate fields in time format.	: (default) 3 character max

3. Press OK.

Change the Short Date Format for a Language

Follow these steps to change the short date format for the selected language.

1. Select Terminal Settings>Time/Date/Regional Settings>Regional Settings>Short Date Format.



The current date is shown in the selected, short date format.

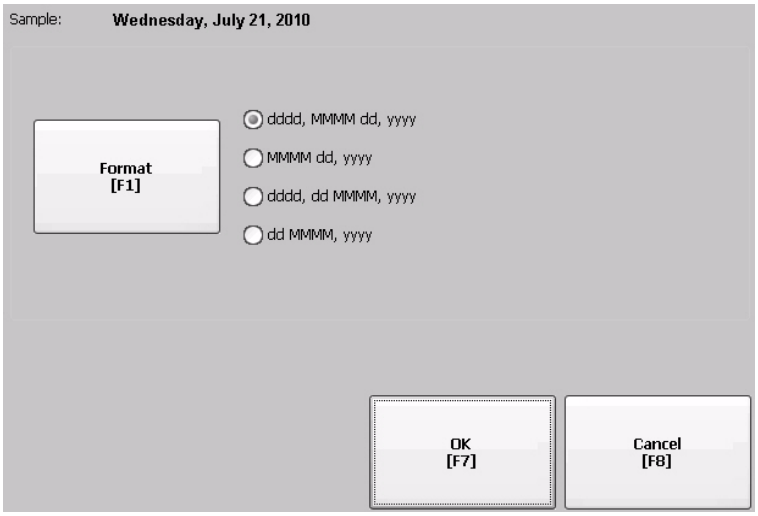
Field	Short Date Formats	Example
Format	M/d/yyyy (default) M/d/yy MM/dd/yy MM/dd/yyyy yy/MM/dd yyyy-MM-dd dd-MMM-yy	9/2/2010 9/2/10 09/02/10 09/02/2010 10/09/02 2010-09-02 02-Sep-10
Separator	Character separator for fields in time format. The default separator is either - or / depending on short date format.	- or / (default) 3 character max

2. Press the Format button to select an available format.
3. Press the Separator button to change the field separator for the date elements.
4. Press OK when done.

Change the Long Date Format for a Language

Follow these steps to change the long date format used by the selected language.

1. Select Terminal Settings>Time/Date/Regional Settings>Regional Settings>Long Date Format.



   The current date is shown in the selected long date format.

2. Press the Long Date Format button to select a date format.

Long Date Formats	Example
dddd, MMMM, dd, yyyy (default) dddd is name of week day MMMM is name of month dd is two-digit day of month with leading zero yyyy is four-digit year	Wednesday, September 01, 2010
MMMM dd, yyyy MMMM is name of month dd is two-digit day of month with leading zero yyyy is four-digit year	September 01, 2010
dddd, dd MMMM, yyyy dddd is name of week day dd is two-digit day of month with leading zero MMMM is name of month yyyy is four-digit year	Wednesday, 01 September, 2010
dd MMMM, yyyy dd is two-digit day of month with leading zero MMMM is name of month yyyy is four-digit year	01 September, 2010

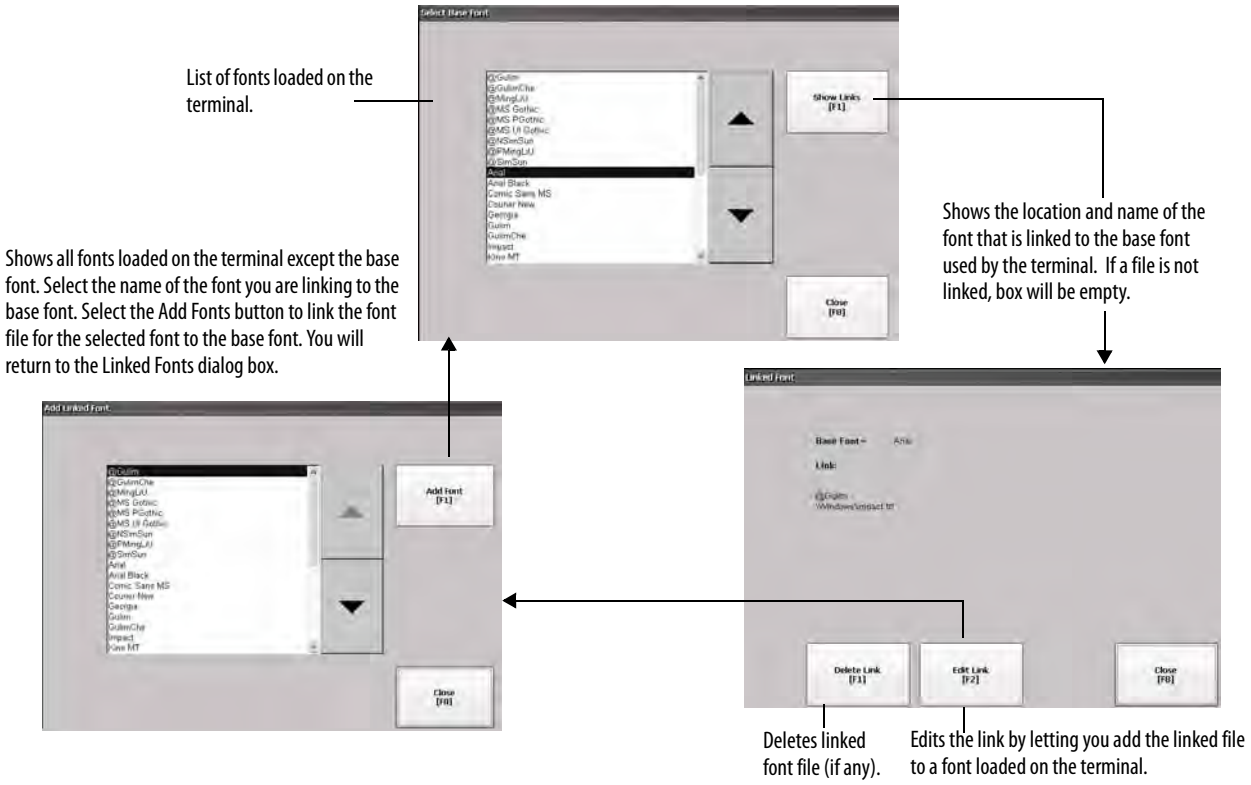
3. Press OK when done.

Font Linking

Font linking lets you run a translated application on the terminal by linking a font file to the base font (for example, linking a Chinese font file to the base font Arial).

For more details on preinstalled terminal fonts and additional fonts available for downloading, see Fonts Resident on Terminal on page 177.

Select Terminal Settings>Font Linking to access this function.



Windows CE Operating System

Windows CE 6.0 Standard Features

All PanelView Plus 6 terminals run the Windows CE 6.0 operating system (OS) providing the foundational OS elements for the majority of user needs.

Shell and User Interface Support

The Windows CE 6.0 operating system provides the following shell and user interface support features:

- Command shell
- Command processor
- Console window
- Windows Explorer shell
- Mouse and touch screen support
- Common dialog
- Control panel applets
- Network user interface

- Software input panel with these input methods:
  - Keyboard and large keyboard
  - CHT Chajei (Chinese)
  - CHT Phonetic (Chinese)
  - MS Kana (Japanese)
  - MS Roma (Japanese)
- PDF reader
- VNC server and client viewer

TIP The platform distributes two VNC client viewers.

- Vncviewer.exe in the \Windows folder on the terminal can be deployed to a personal computer for connecting, viewing, and controlling the Windows CE terminal (PanelView Plus 6).
- Another viewer is available on the terminal to establish a VNC connection between two PanelView Plus 6 terminals. To access this VNC client, choose Start>Programs>VNC Viewer.

TIP The Windows Explorer shell supports right-click functionality. A touch screen press held for one second or longer will produce a right-click.

Application Support

The Windows CE 6.0 operating system (OS) provides application support in both the OS and the Software Development Kit (SDK):

- .Net Compact Framework, version 3.5
- C++ libraries and runtimes
- Component services DCOM/COM/OLE
- Message queueing MSMQ
- MSXML, version 3.0
- MFC for devices, version 8.0
- ATL
- ActiveSync
- CAB file installer/uninstaller
- Toolhelp API
- Error reporting (generator, transfer driver, control panel)

Scripting Support

The Windows CE 6.0 operating system supports these scripting features:

- Batch/command (BAT and CMD files)
- JScript
- VBScript

Network Support

The Windows CE 6.0 operating system supports these network features:

- Winsock support
- Network utilities - ipconfig, ping, route
- Network Driver Architecture (NDIS)
- Windows Networking API/Redirector
- Wired Local Area Network, 802.3, 802.5

Server Support

This table lists servers supported by the Windows CE 6.0 operating system.

Table 33 - Windows CE 6.0 Server Support

Server	Default State	Description
Web server	Enabled	The web server delivers content, such as web pages, using the HTTP protocol over the Web.
FTP server	Enabled	File Transfer Protocol (FTP) is a standard network protocol for exchanging files over the Internet (TCP/IP-based network).
UPnP server	Enabled	Universal Plug and Play (UPnP) is a set of networking protocols that allows devices to install and connect seamlessly to a network.
File Server	Enabled	A network protocol that allows shared access to files, printers, serial ports, and miscellaneous communication between computers on a network.
VNC server	Disabled	Virtual Network Computing (VNC) is a graphical desktop sharing system used to remotely control another computer. It transmits keyboard/mouse events from one computer to another, over a network.
ViewPoint Server	Enabled	A web-server based application that allows remote user access via a web browser to the FactoryTalk View Machine Edition HMI application that is running on the terminal. ViewPoint software is a Rockwell Automation product.

Windows CE 6.0 with Extended Features

PanelView Plus 6 terminals and logic modules with extended features, catalog numbers, 2711P-RP9*x* and 2711P-*xxxx*9, provide additional operating system components.

Table 34 - Operating System with Extended Features

Icon	Software	Icon	Software
	Microsoft Internet Explorer 6 web browser with Silverlight 2		Microsoft Office 2003 PowerPoint file viewer
	Adobe Flash Lite 3.1 ActiveX plug-in for Internet Explorer 6		Microsoft Office 2003 Word file viewer
	Microsoft Remote Desktop Connection		Microsoft Office 2003 Excel file viewer
	Microsoft media player 6.4 and 7.0 OCX		Westtek JETCET PDF viewer
	Microsoft WordPad text editor		

Windows Control Panel

The Windows control panel is the primary desktop interface for configuring a PanelView Plus 6 terminal. You can set system-wide properties, such as network configuration, screen saver configuration, and touch screen calibration.

Table 36 lists the control panel applets. The language of the control panel applets is based on the language set for the operating system. English is the default.

TIP Some control panel operations are also performed from the Terminal Settings in FactoryTalk View ME Station.

You can access the control panel in several ways:

- Choose Settings>Control Panel from the Start menu.
- Open My Device on the desktop, then open the Control Panel.

Table 35 - Control Panel Applets

Name	Description
Accessibility	Adjusts your terminals settings for vision, hearing, and mobility.
Backup & Restore	Performs a backup and restore of an HMI terminal image.
Certificates	Manages digital certificates for establishing trust and secure communication.
Date and Time	Sets the time, date, and time zone.
Dialing	Sets dialing patterns and location settings.
Display	Changes the wallpaper desktop appearances, backlight, screen saver, visible cursor, and rotation settings.
Error Reporting	Enables and configures software error reporting.
Hardware Monitor	Displays voltage and temperature information, and the system event log.
Input Panel	Configures the soft keyboard.
Internet Options(1)	Configures Internet Explorer settings.
Keyboard	Configures an external USB keyboard.
Keypad	Configures the keypad on the terminal display (if one is present).
Logo Manager	Loads and applies a new image to the splash screen and screen saver on the HMI terminal.
Mouse	Sets the USB mouse double-click properties.
Network and Dial-up Connections	Creates and configures direct, dial-up, VPN, and Ethernet connections.
Owner	Sets owner identification and security for device and remote network.
Password	Sets password and enables password protection for startup and Screen Saver mode.
PC Connection	Selects a connection between the device and a personal computer.
Printers	Adds and configures local and network printers.
Regional Settings	Selects the locale and sets the format of numbers, time, date, and currency.
Remove Programs	Uninstalls applications.
Server Config	Configures network servers: VNC, FTP, Web, File, KEPServer.
Services	Enables and disables services and servers.
Storage Manager	Reports information on storage devices. Scans, partitions, defragments, and mounts volumes.
System	Provides general system information. Sets and reports a device name and memory allocation/usage.
Terminal Server Clients(1)	Displays terminal server client access licenses for devices that connect to a terminal server.
Touch	Sets touch-screen properties, cursor, and calibrates touch screen.
User Accounts	Manages user accounts for NTLM security.
Volume & Sound	Adjusts volume and sound properties for events, applications, and key clicks.

(1) Applies only to PanelView Plus 6 terminals with extended features and file viewers.

Backup and Restore

The Backup and Restore application lets you back up the current system image on the HMI terminal, then restore that image to the same terminal, or clone it to other terminals. This function is intended for OEMs who want to back up a terminal image, then clone or copy that same image to multiple terminals.

A typical backup includes the following:

- File system
- Firmware image
- Windows registry

Additional user configuration data is included in the backup if you check Advanced Network & Display Settings.

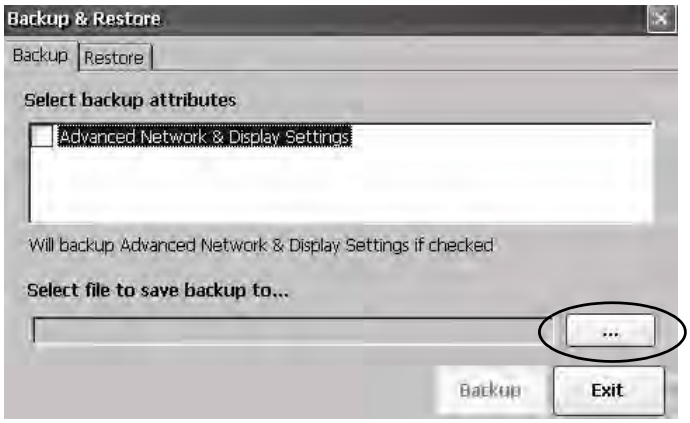
Table 36 - Advanced Network and Display Settings

Network Parameters	Terminal Specific Parameter
Ethernet network	• DHCP-enabled or fixed IP address with subnet mask and gateway • Primary and secondary DNS • Primary and secondary WNS • Speed and duplex settings
USB network	USB IP address and subnet mask, Gateway, DHCP-enabled or fixed IP address
Network	Device name
Display	• Display brightness • Screen saver dimmer timeout

You can back up the terminal image to a file on a USB flash drive or SD card.

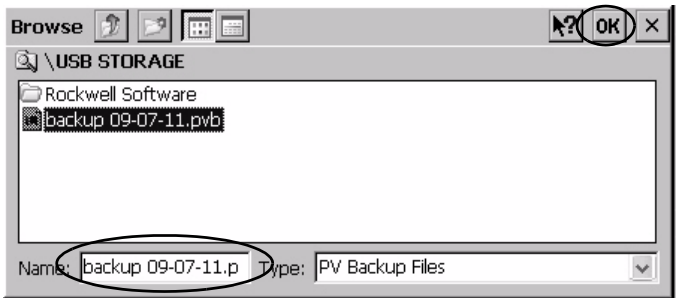
Follow these steps to perform a backup.

1. Insert a USB flash drive or SD memory card into the appropriate slot of the terminal.
2. In the control panel, double-click the Back & Restore icon.
3. Click the browse ... button on the Backup tab.



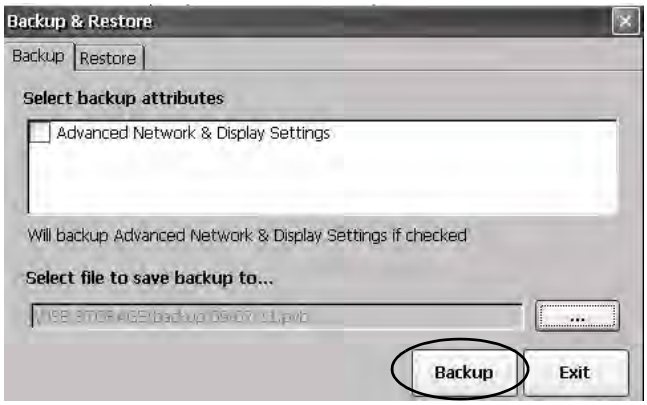
4. Select the target location for the backup file.
   - USB Storage if using a USB flash drive
   - Storage Card2 if using an SD card
   - Target folder
5. Type a name for the backup file.

   All backup files have the .pvb file type.
6. Click OK.



7. Click Backup to start the process.

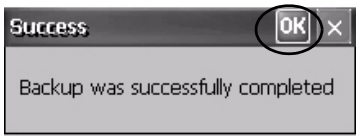
   A progress bar shows the status of the backup.



   The backup may take a few minutes. You will receive notification when the backup completes successfully.

8. Click OK.

   If the file exists, you will be asked if you want to overwrite the current file.

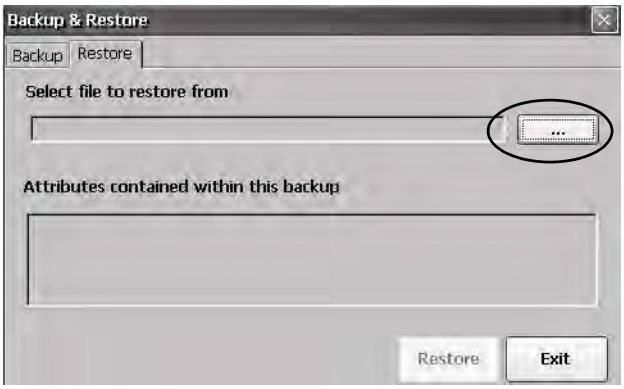


9. Click Exit to close the Backup & Restore dialog.

TIP You can verify that .pvb file was successfully created by double-clicking My Device and selecting the target location for the backup.

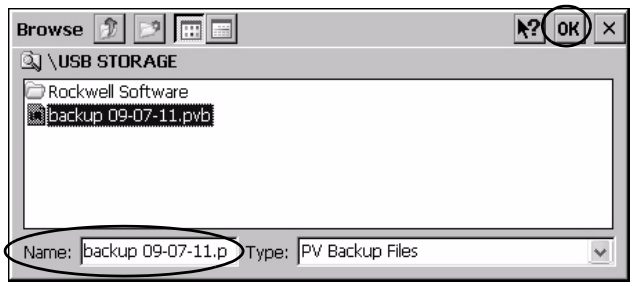
Follow these steps to restore or clone a backup image to a terminal from a USB flash drive or SD card.

1. Insert the USB flash drive or SD memory card into the appropriate slot on the target terminal.
2. In the control panel, double-click Backup & Restore.
3. Click the Restore tab.
4. Click the ... browse button to select the backup file to restore.



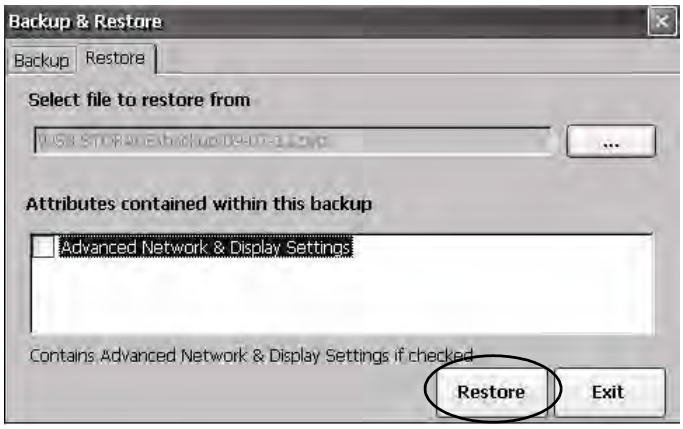
5. Select the location of the backup file.
   - USB Storage if using a USB flash drive
   - Storage Card2 if using an SD card
   - Target folder containing .pvb file

   This example shows \USB Storage as the location.
6. Select the .pvb backup file to restore.
7. Click OK.

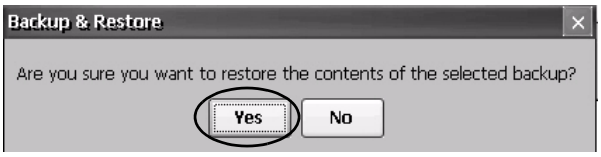


8. Click Restore.

   The restore automatically includes advanced network and display settings if this option was checked when the backup was performed.



9. Click Yes to start the restore.



The terminal starts the restore process. It may take a few minutes.

IMPORTANT Do not remove the USB flash drive or SD card, or power off the terminal during the restore. This could corrupt the firmware.

If the restore fails, you will need to reset the terminal from the maintenance menu. Refer to Access Maintenance Operations on page 169 for details.

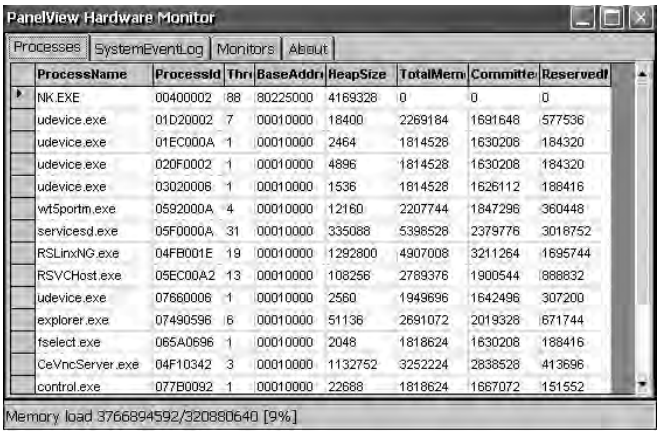
When the restore has completed successfully, the terminal restarts.

Hardware Monitor

The PanelView Hardware Monitor provides status and troubleshooting information for the terminals including processes, system event log details, and monitoring of battery voltages, temperatures, and system usage, for example, CPU and memory loading.

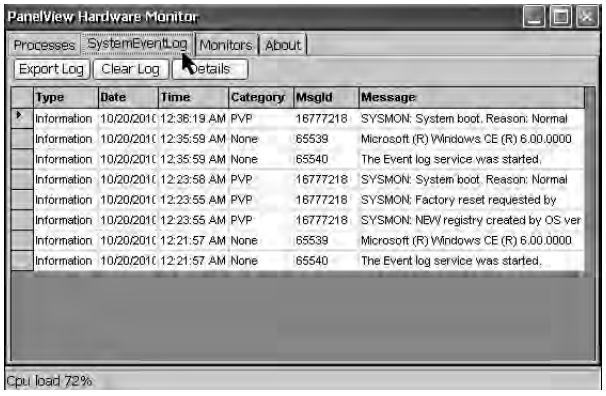
Processes

The Processes tab of the Hardware Monitor shows all processes currently running on the PanelView Plus 6 terminal and memory usage of each process.



System Event Log

The System Event Log tab of the PanelView Hardware Monitor displays warnings, errors, and events logged by the terminal.

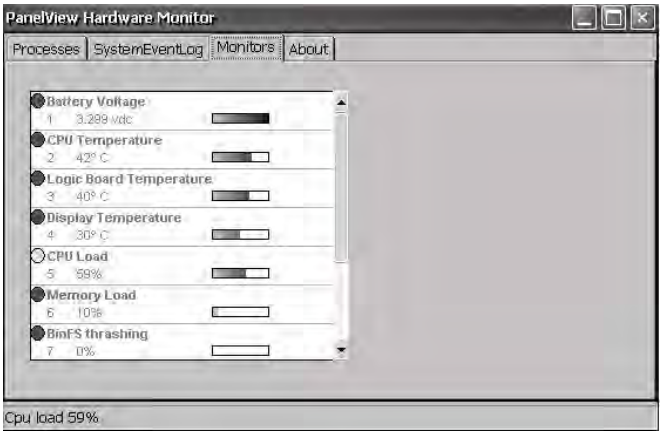


The log provides a date and time stamp of when each event occurred and text describing the event. The maximum size of the log is 1 MB, approximately 4,000 records. If the log exceeds 1 MB, the oldest 512KB of information is removed.

- The Export Log button lets you export the event log to a CSV file (*.csv) in the \Windows folder with the default file name, SystemLog.csv.
- The Clear Log button lets you clear all events from the log.
- The Details button lets you view more details for a selected event.

Monitors

The Monitors tab of the PanelView Hardware Monitor provides continuous temperature, voltage, and load information for the terminal.



Battery Voltage

The Monitors tab provides a visual status and voltage reading of the battery for the real-time clock. The actual battery voltage is updated at powerup and then every hour.

Table 37 - Battery Conditions

Condition	Logic Module Battery
Depleted	Less than 2.0V indicates a dead battery or no power.
Low	2.0…2.74V
Normal	2.75V or higher

Temperatures

The Monitors tab provides a visual status and current temperature of the terminal display and logic module CPU. The temperature is updated every 10 seconds.

Table 38 - Temperature Conditions

Condition	Logic Module CPU	Display
Low	–	10 °C (50 °F) or lower
Normal	25…94 °C (77…201 °F)	11…59 °C (52…138 °F)
High	95 °C (203 °F) and higher	60 °C (140 °F) and higher

Keypad Properties

Use the Keypad and Keyboard applets to adjust settings for the membrane keypad of your terminal or an attached USB keypoard. The Keyboard applet is always present. The Keypad applet appears only if your device has a keypad. If you attach two USB keyboards, settings are used that will work with both keyboards.

Repeat Tab

The Repeat tab on the Keypad or Keyboard Properties dialog enables and disables the character repeat behavior of keys on the keypad or attached keyboard.

When character repeat is enabled, you can set the repeat delay and repeat rate of keys. Verify changes to the repeat rate and delay settings by pressing a key in the test edit box.

Touch Properties

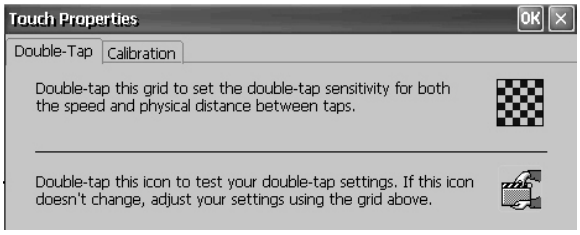
The Touch Properties applet is accessible only on devices with a touch screen. It lets you calibrate the touch screen and set the sensitivity of touch screen taps.

Calibration

The Calibration tab lets you recalibrate the touch screen if your device is not responding appropriately to taps. Follow the dialog instructions to recalibrate.

Double-Tap

The Double-Tap tab on the Touch Properties dialog lets you set and test the double-tap sensitivity of the touch screen taps.



Display Properties

The Display Properties applet provides tabs to control the desktop background image and appearance, the brightness of the backlight, and screen saver settings.

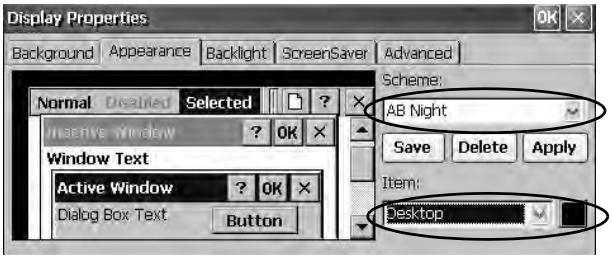
Desktop Background

The Background tab in the Display Properties dialog controls the background bitmap on the desktop. The default bitmap is abclocknight.

You can choose another image from the pull-down menu or browse the system for a bitmap image. Custom images are in the \Windows folder.

Background Appearance

The Appearance tab in the Display Properties dialog controls the visual style and colors of the desktop and other window elements.

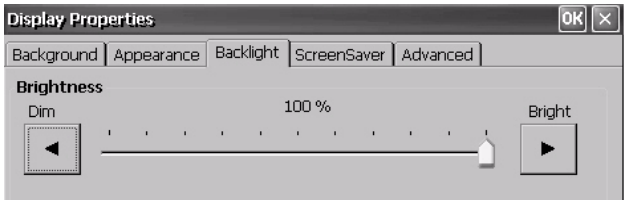


Two custom schemes and images are provided for day or night viewing. When changing schemes, remember to also change the image on the Background tab.

Scheme	Desktop Color	Backgroud Logo
AB Day	Blue	abclocknight
AB Night	Black	ablclockday

Backlight Intensity

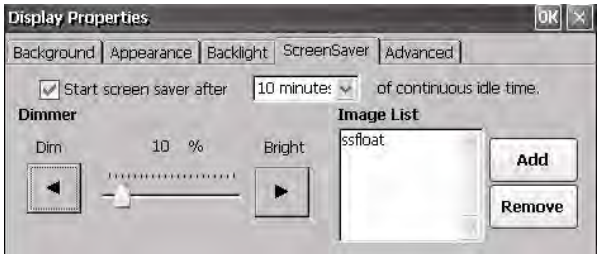
The Backlight tab in Display Properties lets you set the brightness level of the display between 1...100%. At 1%, the display is minimally visible.



When the backlight is in Overdrive mode, the backlight brightness level cannot be adjusted.

Screen Saver

The screen saver extends the lifetime of the display by dimming the backlight when the terminal is idle. The screen saver will activate and display a moving bitmap at a reduced brightness level after a continuous idle time. When the screen saver is deactivated, the display brightness returns to its normal level.



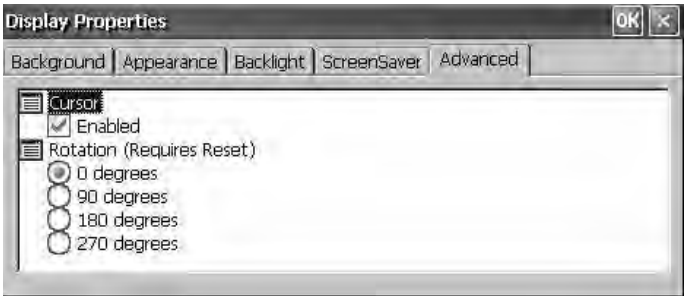
The Screen Saver tab in Display Properties lets you perform these operations:

- Enable the screen saver using a specified idle timeout. The default idle time is 10 minutes.

  When the screen saver is activated, the dimmer controls the backlight intensity level. You set the brightness level of the dimmer in the range 0...100%. The default dimmer intensity is 10%. At 0%, the backlight is off and the display is dark.
- Browse the system for a bitmap to be displayed by the screen saver at a nonzero brightness level. The default screen saver is SSFloat.bmp. Use the Add or Remove buttons to change the screen saver bitmap. The system recognizes bitmaps stored in the \Windows folder.
- Disable the screen saver by clearing the Start screen saver checkbox.

Cursor

The Advanced tab in Display Properties lets you enable or disable the visible cursor that you see on the display. The cursor is visible by default.



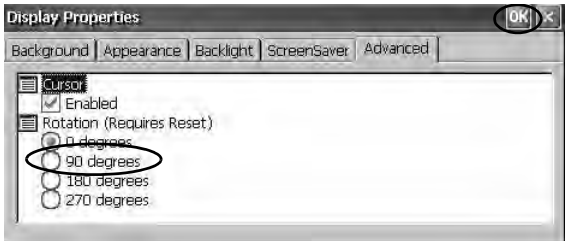
Rotation of Terminal Displays

You can rotate the display image on the terminal in 90° increments from 0°. The default rotation angle is 0°. This feature is useful for installations that require different mounting orientations of the HMI device.

A terminal restart is required after changing the rotation angle. Touch screen terminals also require calibration to realign touch screen presses.

Follow these steps to rotate the HMI display image.

1. On the Advanced tab of the Display Properties dialog, select a rotation angle and click OK.



2. Restart the terminal.
   - Press the Reset switch on the back of terminal.
   - Choose Programs>Restart System form the Start menu.

   The terminal goes through its start-up sequence. If the terminal has a touch screen, the calibration display will appear in the selected rotation. This example shows a 90° rotation angle.

3. Follow the calibration instructions to recalibrate the touch screen.

   All displays will appear in the selected rotation on the terminal. The example shows the displays and the terminal rotated 90° clockwise.

Logo Manager

Use the Logo Manager to change the logo that appears on the splash screen at startup and the default screen saver image. The default image is the Allen-Bradley logo (ablogo.bmp).

The logo can be a .bmp, .jpg, .gif, or .png image. For best results, it is recommended that the logo be created as a 90 x 90 pixel, 16-bit color image.

Before applying the new logo, you can do the following:

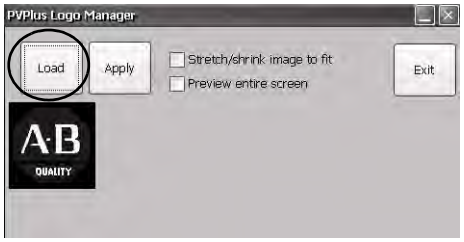
- Preview the logo on the splash screen.
- Resize the image to fit the fixed area on the splash screen.

Follow these steps to apply a new logo to the splash screen and screen saver.

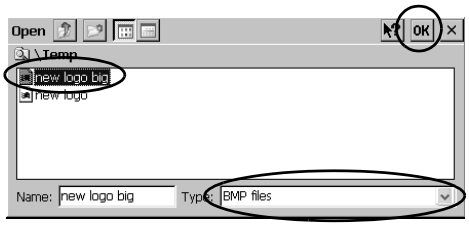
1. Double-click the Logo Manager icon.

   The Logo Manager dialog opens with the current logo.

2. Click Load.



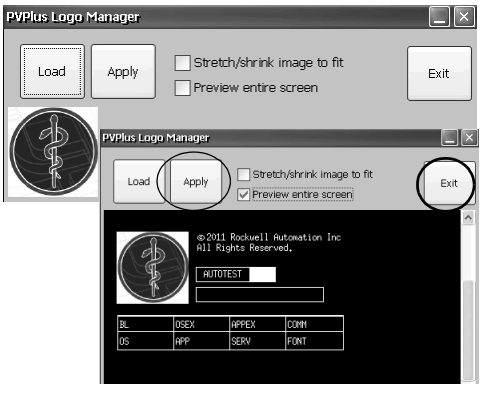
3. Select the location of the new image you want to load.
   - A folder
   - Storage Card2 - SD card
   - USB Storage - USB drive
4. Select the image file to load.
5. Verify the file type is correct.
6. Click OK.



   The new logo appears in the Logo Manager dialog.

7. Check 'Preview entire screen' to view the logo on the splash screen.

   If the logo is truncated or too small, check 'Stretch/shrink image to fit' to resize the logo to fit in the area.



8. If satisfied with the preview, click Apply.

   A dialog confirms that the splash screen was successfully updated. The default screen saver, ssfloat.bmp, is also updated with the new image.

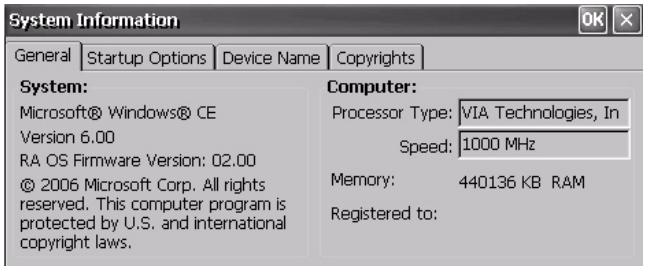
9. Click OK, then click the Exit button to close the Logo Manager dialog.

System Information

The System Information applet provides tabs to let you view and set system-wide properties for your terminal.

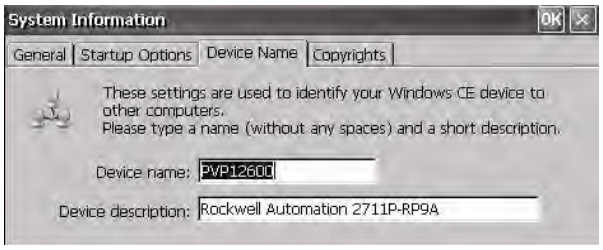
General Information

The General tab of the System Information dialog shows the current version of the Windows CE operating system, the processor type and speed, and the RAM memory on terminal.



Device Name

The Device Name tab of the System Information dialog identifies your terminal to other devices on the network by providing a device name and description.



TIP Duplicate names will conflict and cause network problems.

Startup Options

The Startup Options tab of the System Information dialog lets you show or hide battery warnings at startup, watchdog errors at startup, and launch the platform as either an open or closed system.

Battery Warnings

If the battery is low, missing, or dead, a warning will display each time the terminal starts up.

TIP

- The terminal can be operated without a battery if it is not required for the time and date to be accurate.
- When replacing the battery, you can verify the accuracy of the system date and time from the desktop control panel or the terminal settings in FactoryTalk View ME Station.

You have three options for handling the battery warning.

Battery Warning Startup Options	Description
Always show at startup (continue with startup)	Shows the battery warning at startup with FactoryTalk View ME Station running behind it. This is the default.
Always show at startup (halt startup)	Shows the battery warning at startup but halts the startup or boot process until you press OK.
Never show at startup	Hides the battery warning at startup.

Shell Options

Use the Shell options to launch an open or closed desktop at startup or to set the visual appearance of button controls.

Shell Startup Options	Description
System Type	Launches the terminal as an open or closed system at startup. • Open - launches the Windows CE desktop on startup. • Closed (default) - launches FactoryTalk View ME Station on startup. You can also allow or restrict desktop access within FactoryTalk View ME Station by choosing Terminal Settings>Desktop Access Setup. Refer to Desktop Access on page 52.
User Interface Button Controls	Sets the visual appearance of control buttons at startup. • Windows XP Style (default) • Windows 95 Style

Boot Option

The boot option provides a way for you to enter Safe mode at startup.

Safe Mode Option	Description
Do not detect safe mode request at startup	Disables safe mode detection during startup. This is the default.
Detect safe mode request at startup	Displays a small white box in the lower left corner of the terminal display during startup that you can touch or press F1 to enter safe mode. This lets you bypass a loaded FactoryTalk View ME application and go directly to Configuration mode. If you don't press F1 or touch the white box, the system boots up normally. Another way to enter Safe mode is to access Maintenance mode. Refer to Access Maintenance Operations on page 169.

Watchdog Errors

You can show or hide watchdog errors at startup.

Watchdog Error Options	Description
Always show watchdog errors at startup	Shows the fatal watchdog error (error 02) at startup and halts the normal boot process. This is the default. The system launches the maintenance window with the watchdog error displayed. You can continue booting from this window. Refer to Access Maintenance Operations on page 169 for details. The error is logged to the System Event log.
Never show watchdog errors at startup	Hides the errors at startup and logs the error to the system event log.

Advanced Diagnostics

Advanced diagnostics are for technical support use only to diagnose and resolve system errors. They are not for use in a normal production environment.

User Accounts

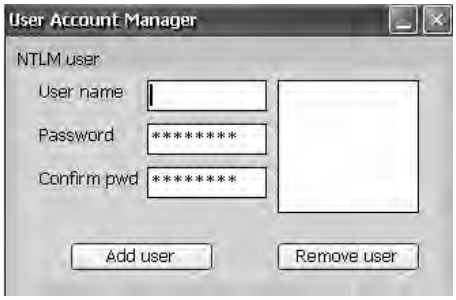
The User Accounts application lets you set up NTLM user accounts that can be used to authenticate client connections when using the FTP, web, and file servers.

TIP NTLM is the authentication protocol used on networks using Windows operating systems.

A user account consists of a user name and password.

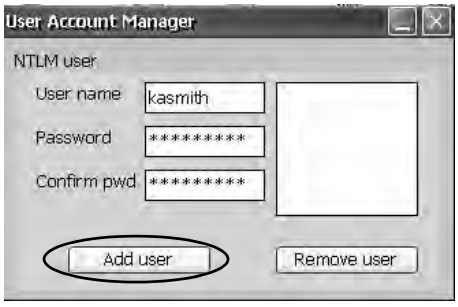
Follow these steps to add a user account.

1. Double-click the User Accounts icon.



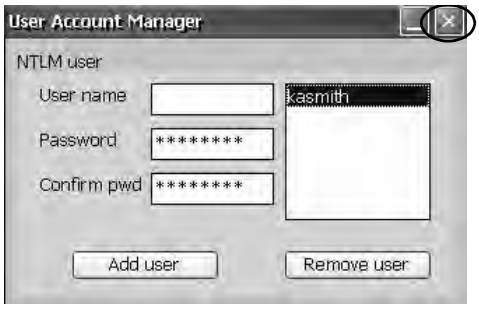
2. Click in the user name field and type a name.
3. Click in the Password field to clear the field and type a password.

   Asterisks display as you type the password.
4. Re-enter the password in the Confirm pwd field.
5. Click Add user.



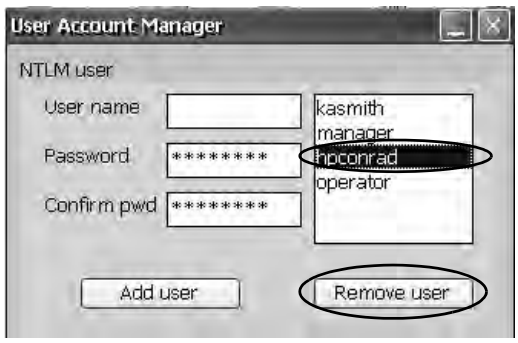
6. Click OK to acknowledge the new user account.

   The new user name is added to the user list.
7. Repeat steps 1...6 to add additional user accounts.
8. When done, click X to close the dialog.



Follow these steps to remove a user account.

1. Select a name in the user name list.
2. Click Remove user.



3. Click Yes to confirm the removal of the selected user account.

   The user account is permanently deleted from the user account list.

4. Close the User Account Manager dialog by clicking x.

TIP Users entered in authentication lists of FTP, web, or file server configurations are removed when user accounts are deleted.

Services

The Services application shows servers that are supported by the terminal and lets you enable (start) or disable (stop) each server.

The buttons are color coded:

- Green indicates the server is currently running and will be automatically started at system startup.
- Red indicates the server is not currently running.
- Gray indicates the server is not available on platform.

To enable or disable a server, press the corresponding button and the color will change accordingly.

Network Server Configuration

The Server Config applet in the control panel configures settings used for VNC, FTP, web, KEPServer, and file server activities on an Ethernet network.

VNC Server Configuration

The VNC Server tab in the Network Server Configuration dialog configures settings used by a client device to view or control the terminal over a VNC connection. The VNC service supports two concurrent client connections.

TIP Always click OK to apply new settings. You will be asked if you want to restart the service immediately.

The terminal provides two VNC client viewers:

- Vncviewer.exe can be deployed to a personal computer for connecting, viewing, and controlling the VNC server on the terminal. This viewer is in the \Windows folder.
- Another VNC viewer is available on the terminal to establish a VNC connection between two PanelView Plus terminals. To access this client, choose Start>Programs>VNC Viewer.

Table 39 - VNC Server Parameters

VNC Parameter	Description	Default
General		
View Only	Check this option to allow users to only view terminal displays over a VNC connection. Uncheck this option to allows users to both control and view terminal displays over a VNC connection. If security is disabled, users are not required to enter a password when connecting to the terminal.	Enabled for view only
Security		
Enable Security	Check this option to require password protection for VNC connections to the terminal. This means users must enter a valid password before being allowed to view or control terminal displays. If you enable security, you must supply a password for one these parameters: • Password - for control and view operations • View-only password - for view only operations	Disabled (Unchecked)
Password	Specifies a password a user must enter when establishing a VNC connection to control terminal displays. Select the box, then type a password in the field at the bottom of the dialog. The password is a maximum of seven characters. Password protection is required to control terminal displays if: • View Only is unchecked (allowing control access) • Security is enabled	No password
View-only password	Specifies a password a user must enter when establishing a VNC connection to view terminal displays. Select the box, then type a password in the field at the bottom of the dialog. The password is a maximum of seven characters. **TIP**: If you uncheck the View Only parameter, you are allowing control and view access to the terminal. With control access enabled, you can restrict one or more users to view-only access by providing a View-only password. View-only password protection is required to view terminal displays if security is enabled. • View Only is checked or unchecked • Security is enabled	No password

VNC Connection Requiring Password for View-only Operations

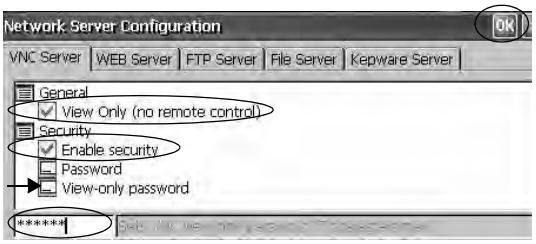
The default VNC configuration enables view-only control of the terminal without requiring a password. This applies to the VNC viewer that resides on the terminal and the viewer you can deploy to a computer.

This example uses the VNC viewer deployed to a computer to connect to the HMI terminal.

TIP Copy vncviewer.exe, in the \Windows folder on the terminal, to your computer and install the TightVNC software.

Follow these steps to configure a VNC connection that requires password protection to view and control terminal operations.

1. On the VNC Server tab, check:
   - View Only
   - Enable security

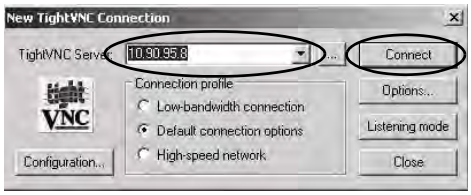


2. Select View-only password, then enter a seven-character password in the field that opens.
3. Click OK, then restart the service to apply the new settings.

Follow these steps to launch a VNC connection to view terminal operations.

1. From your computer, choose TightVNC Viewer from the Start>Programs>TightVNC menu.
2. Enter the IP address of your terminal and click Connect.

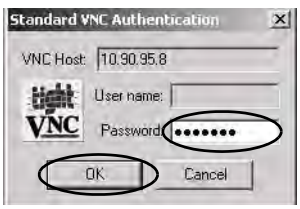
   Click the network connection icon in the system tray to view the IP address.



TIP If security is disabled, a password is not required.

3. Enter the View-only password defined in the VNC configuration and click OK.

   The PanelView VNC Server opens the current view of the HMI terminal on your desktop. You can view, but not control terminal operations.



4. When finished, close the PanelView VNC Server.

VNC Connection With Separate Passwords for View and Control Operations

You can configure the VNC server to require separate passwords for view-only and control operations.

This example uses the VNC viewer deployed to a computer to connect to the HMI terminal.

TIP Copy vncviewer.exe, in the \Windows folder on the terminal, to your computer and install the TightVNC software.

Follow these steps to configure the VNC server to require password protection for view-only and control operations.

1. On the VNC Server tab:
   - Clear View Only
   - Check Enable security
2. Select Password, then enter a password for control privileges.

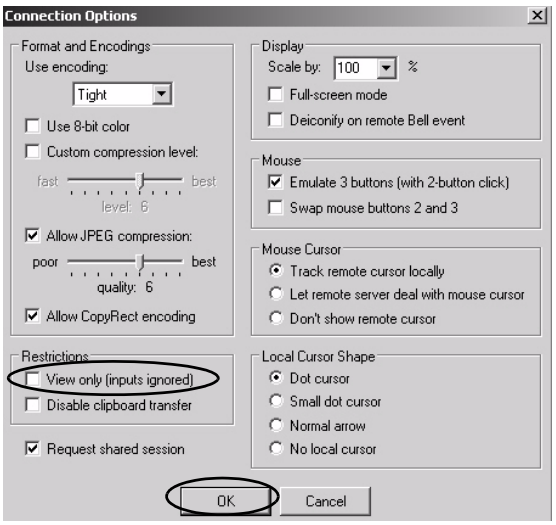
   Passwords are a maximum of seven characters.

3. Select View-only password and enter a password for view-only privileges.
4. Click OK, then restart the service to apply the new settings.

Follow these steps to launch a VNC connection to enable control of the terminal.

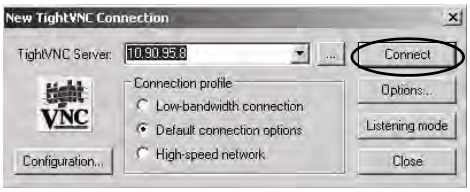
TIP To launch a VNC connection from your computer that requires password protection for view-only operations, refer to VNC Connection Requiring Password for View-only Operations on page 105 and follow steps 1…4.

1. From your computer, choose TightVNC Viewer from the Start>Programs>TightVNC menu.
2. Click Options.



3. Clear View only (inputs ignored).
4. Click OK.

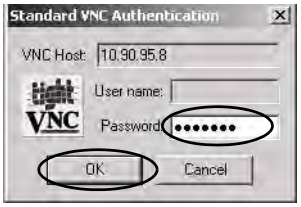
5. Enter the IP address of your terminal and click Connect.



Click the network connection icon in the system tray to view IP information.

The Standard VNC Authentication dialog opens.

6. Enter the control password that was defined in the VNC configuration dialog on the terminal and click OK.

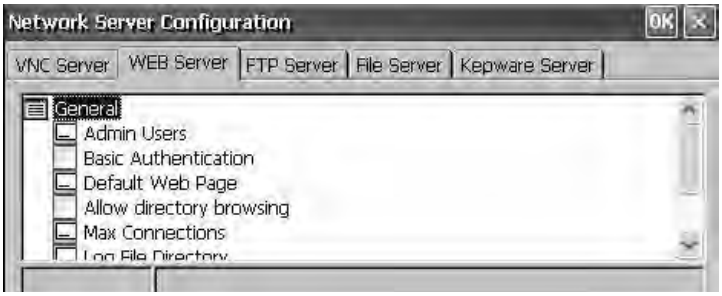


The PanelView VNC viewer opens.

7. On your computer, perform some actions to verify that you have control of the terminal.
8. When finished, close the PanelView VNC Server.

Web Server Configuration

The Web Server tab in the Network Server Configuration dialog configures settings that are used for HTTP web activities. These are standard Microsoft Windows CE parameters and outside the scope of this document.



TIP Always click OK to apply new settings. You will be asked if you want to restart the service immediately.

Table 40 - Web Server Parameters

Parameter	Description	Default
Admin Users	Specifies a list of users allowed to administer web activities. When selected, you can enter a list of user names, separated by semicolons, in the field that opens at the bottom of the dialog.	ADMIN
Basic Authentication	Check this option to require a user name and password to access the web server.	Disabled
Default Web Page	Specifies default web pages users are allowed to access.	default.htm;index.htm
Allow Directory Browsing	Check this option to allow users to browse directories on a web server.	Disabled (unchecked)
Max Connections	Specifies the maximum number of incoming web connections allowed.	256
Log File Directory	Specifies the path where the log file is stored. This file logs web activity.	\windows\www
Max Log Size	Specifies the maximum size of the log file stored in the log file directory. A new log file is created, when the current log file reaches the maximum size.	32768 bytes
NTLM Authentication	Check this option to require a valid user name and password to access the web server. If NTLM Authentication is enabled, you must enter a valid user name in the Admin Users field. NTLM user accounts are defined in the User Account Manager dialog of the control panel.	Disabled (unchecked)

FTP Server Configuration

The FTP Server tab in the Network Server Configuration dialog configures settings that are used for exchanging files over a network. These are standard Microsoft Windows CE parameters and outside the scope of this document.

The default FTP configuration allows any user to establish an FTP connection to the HMI terminal by logging in anonymously and downloading files from the FTP default directory (\Temp).

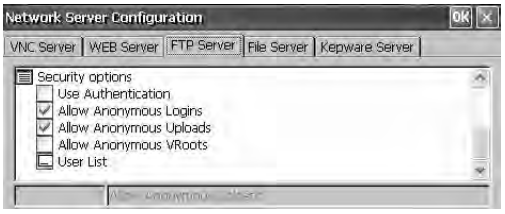
TIP Always click OK to apply new settings. You will be asked if you want to restart the service immediately.

Table 41 - FTP Server Parameters

FTP Parameters	Description	Default
General		
Default Directory	Specifies a file storage location on your HMI terminal for transferring files. This is the directory that users will come to when they first connect to the FTP server.	\Temp\
Idle Timeout	Specifies the time in seconds after which inactive control connections are closed during a data transfer. An FTP session requires one control connection, plus one data connection during file transfers. Without a timeout, the FTP server process may be left pending indefinitely if the corresponding client crashes without closing the control connection.	300 seconds (5 minutes)
Debug Output Channels	Specifies the number of debug output channels.	2
Debug Output Mask	Specifies the port number of the output mask used for debugging.	23
Base Directory	Specifies the path where the FTP log file and other support files are stored.	\Windows
Log Size	Specifies the maximum size of the file that logs FTP activities. The log file is stored in the base directory. A new log file is created, when the current log file reaches the maximum size.	4096 bytes
Security Parameters		
Use Authentication	Check this option to require a valid NTLM user name and password to access the FTP server. If authentication is enabled, you must enter one or more valid user names in the User List field. NTLM user accounts are defined in the User Account Manager dialog of the control panel.	Disabled (Unchecked)
Allow Anonymous Logins	Check this option to allow anyone to connect to the ftp server. Anonymous logins do not require a user name and password.	Enabled (Checked)
Allow Anonymous Uploads	Check this option to allow users logged in anonymously to upload (or write) files to the FTP server (or default directory). If unchecked, users logged in anonymously will only be allowed to download (or copy) files from the server.	Disabled (Unchecked)
Allow Anonymous VRoots	Check this option to allow users logged in anonymously to access virtual roots.	Disabled (Unchecked)
User List	Specifies NTLM users allowed to access the ftp server and exchange files to or from the default directory. When selected, you can enter a list of NTLM user names, separated by semicolons, in the field that opens at the bottom of the dialog. User names and passwords are defined in the User Accounts dialog of the control panel.	None

FTP Anonymous Login and Upload

Follow these steps to establish an FTP connection to the terminal by allowing anonymous logins and file transfers to or from the default FTP folder on the terminal.



TIP If Allow Anonymous Uploads is not checked, you would be able to copy files from the default FTP folder on the terminal but not to the folder.

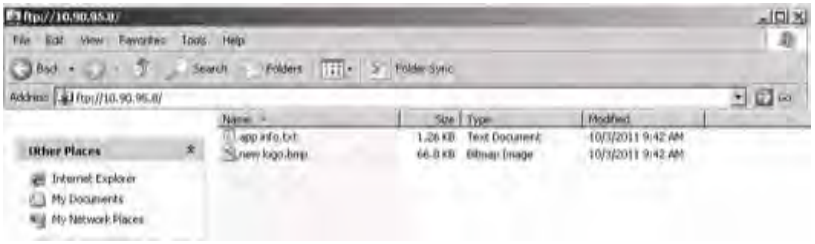
1. Open your web browser or any folder on your computer.

TIP You need the IP address of your HMI terminal to establish an FTP connection. Click the network connection icon in the system tray to view IP information.

2. Type the IP address of the terminal in the address field using the syntax ftp://ipaddress_of_hmi_terminal.

   ftp://90.95.80.8

   An anonymous connection is established to the \Temp folder which is the FTP default directory on the terminal. The folder shows two files.



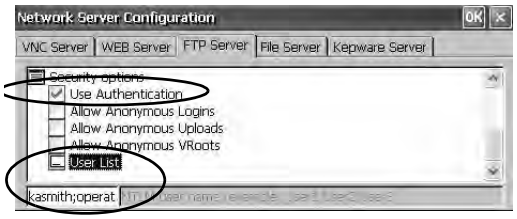
   If you launch the FTP connection from your browser, you might see this view.

   To see the folder view, click Page, then choose File>Open FTP site in Windows Explorer.

3. Transfer files between your computer and the FTP folder.
   - Drag or copy a file from the FTP folder to your computer.
   - Drag or copy a file to the FTP folder from your computer.

FTP Connection Requiring User Authentication

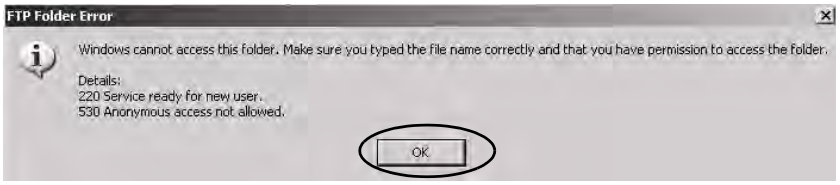
Follow these steps to establish an FTP connection to the terminal by first entering a valid user name and password.



1. Open your web browser or any folder on your computer.
2. Type the IP address of the HMI terminal in the address field using the syntax ftp://ipaddress_of_hmi_terminal.

   ftp://90.95.80.8

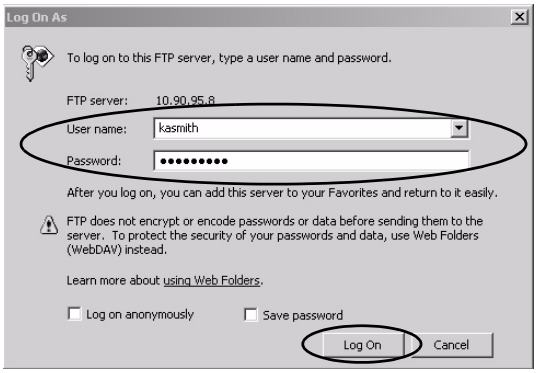
3. Click OK when you see the FTP Folder Error dialog.



   If you launch the FTP connection from your browser, you might see Internet Explorer cannot display this web page. From the Page menu, choose File>Open FTP site in Windows Explorer.

4. Choose Login As... from the File menu.

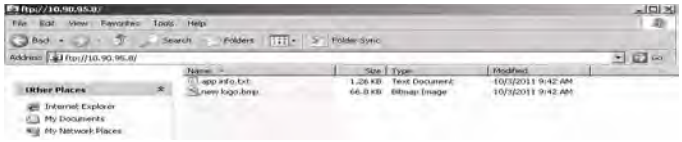
   The user name field is populated with the first user name entered in the User List of the FTP configuration.



TIP The user name you enter must be in the User List of the FTP configuration and previously set up as a valid account in the User Accounts application.

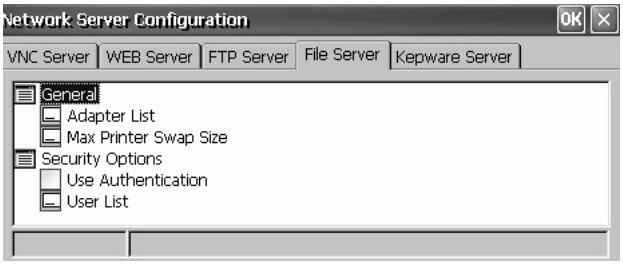
5. Type a valid user name and password, then click Log On.

   The default FTP directory on the terminal opens. You can transfer files to or from this folder.



File Server Configuration

The File Server tab in the Network Server Configuration dialog provides settings that allow shared access to files, printers, serial ports, and miscellaneous communication between computers on a network. These are standard Microsoft Windows CE parameters and outside the scope of this document.



TIP Always click OK to apply new settings. You will be asked if you want to restart the service immediately.

Table 42 - File Server Configuration

Parameter	Description	Default
General		
Adapter List	Provides a list of allowed adapters.	* (all adapters)
Max Printer Swap Size	Specifies the maximum size of the printer swap file.	4096 bytes
Security Options		
Use Authentication	Check this option to require a valid NTLM user name and password to access the file server. If authentication is enabled, you must enter one or more valid user names in the User List field. NTLM user accounts are defined in the User Account Manager dialog of the control panel.	Disabled (unchecked)
User List	Specifies a list of valid NTLM users allowed to access the file server. When selected, you can enter a list of NTLM user names, separated by semicolons, in the field that opens at the bottom of the dialog. User names and passwords are defined in the User Accounts dialog of the control panel.	None

KEPServer Configuration

The KEPServer tab in the Network Server Configuration lets you select Kepware serial communicaton drivers for a connected device.

TIP Always click OK to apply new settings. You will be asked if you want to restart the service immediately. You must also reset your terminal.

Printer Support

The PanelView Plus 6 platform supports selected USB printers such as Canon, Epson, Hewlett-Packard, and Brother. Automatic printer installation using plug-and-play capabilities is supported as well as manual installation if a suitable printer driver is available. You can connect a printer to either USB host port on the terminal.

For more information on supported printers, go to the knowledgebase at http://www.rockwellautomation.com/support/ and search for ID 111636 in the Search Answers box.

Printers are configured and managed from the Printers applet in the desktop control panel. A wizard is supported for each printer type.

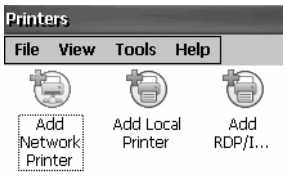


Table 43 - Support for Printers

Printer Type	Description
Local USB	You can connect a JETCET supported printer to a USB host port. The printer attached to the USB host port can be shared by a remote terminal when configured as a network printer on the remote terminal.
Network	The terminal supports a remote printer connected to the network via the Ethernet port. The printer can be addressed by its device name or IP address.
RDP /ICA	A local printer can be made available to a Windows server application that is running in an RDP (Remote Desktop Protocol) session on the terminal. (1)

(1) Applies only to PanelView Plus 6 terminals with extended features.

After configuring a printer, you can access it from desktop applications and from FactoryTalk View ME Station in the Terminal Settings>Print Setup dialog. Applications can also select and share printers.

Automatic Printer Installation

Follow these steps to install a plug-and-play printer from the Windows desktop. For manual printer installation, refer to page 115.

TIP The procedure illustrates automatic plug-and-play installation for the Hewlett Packard HP deskjet 5650 printer.

1. Connect the printer to one of the USB host ports on the terminal.
2. Plug the power cord of the printer into an outlet and turn the printer on.

   Windows detects your plug-and-play printer and, in many cases, installs it without requiring you to make any selections.

   The printer is ready to print.

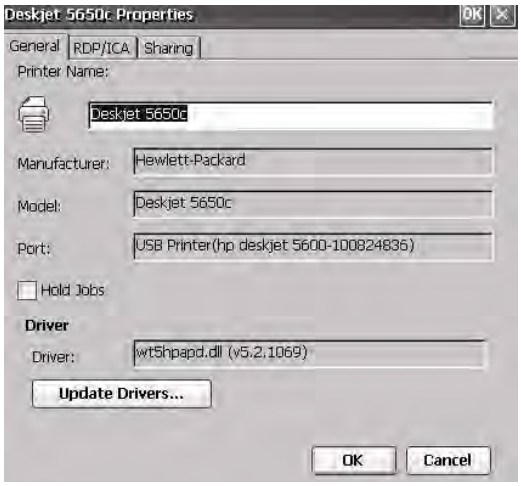
IMPORTANT If automatic plug-and-play installation is not supported for a printer, this error is logged to the System Event log in the Hardware Monitor.

'JETCET PRINT was unable to auto-configure printer. To manually configure printer, go to the Printers folder from the Control Panel.'

3. Verify printer installation from the desktop control panel by opening the Printers applet.

   You should see an icon for the Deskjet 5650C printer. The check mark indicates this is as the default printer.

4. From the File menu, choose Properties to view the properties of the printer.

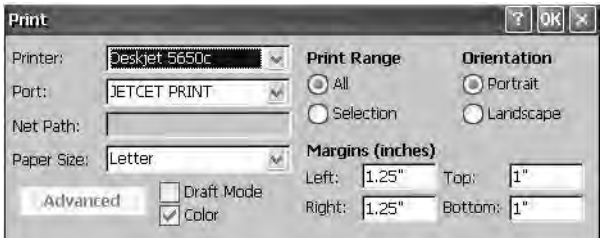


   Printer configuration includes the printer name, manufacturer and model, printer driver, and port-specific parameters.

   TIP
   - New printer configurations are retained through a power cycle.
   - Printers setup through the desktop control panel are also available within FactoryTalk View ME Station when you choose Terminal Settings>Print Setup.

5. Right-click the printer and print a test page to verify installation.

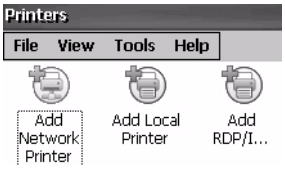
When printing from an application such as WordPad, a Print dialog will open where you can adjust print settings as needed.



Manual Printer Installation

Follow these steps to manually set up a supported printer.

1. Connect the printer to the USB port.
2. Plug the power cord of the printer into an outlet and turn the printer on.
3. From the desktop control panel, open the Printers applet.
4. Select Add Local Printer.



5. Follow the Add Local Printer Wizard instructions to configure the printer.
   - Verify the connected printer appears on the USB printer port.
   - Select the manufacture and model of the JETCET printer.
   - Accept the default printer name or enter another.
   - Print a test page to verify the installed printer.
   - Specify whether you want the printer to be shared on the network.

Taskbar

The desktop taskbar has buttons to access the Start menu as well as terminal IP information, the input panel, current language and time, and the desktop.

You can turn the desktop taskbar on or off by choosing Start>Settings>Taskbar, then checking or clearing the Auto Hide check box. On touch screen terminals, touching the bottom of the display will recover the task bar in Auto Hide mode.

Windows Explorer

From the desktop, you can access Windows Explorer in several ways:

- Open the My Device icon on the desktop.
- Choose Start>Programs>Window Explorer.

Besides the typical system folders, a few folders contain items that are specific to the PanelView Plus 6 platforms.

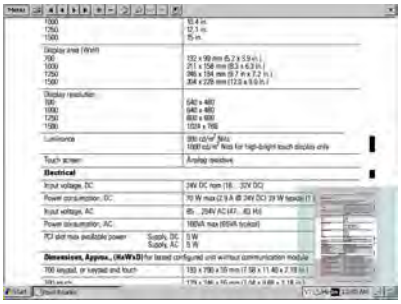
Folder	Content
Application Data	Contains FactoryTalk View Machine Edition application files. Path: \Application Data\Rockwell Software\RSViewME
VFS (Virtual File System)	Contains firmware files and backup/restore files for the current system image. Path: \VFS\Platform Firmware

PDF Reader

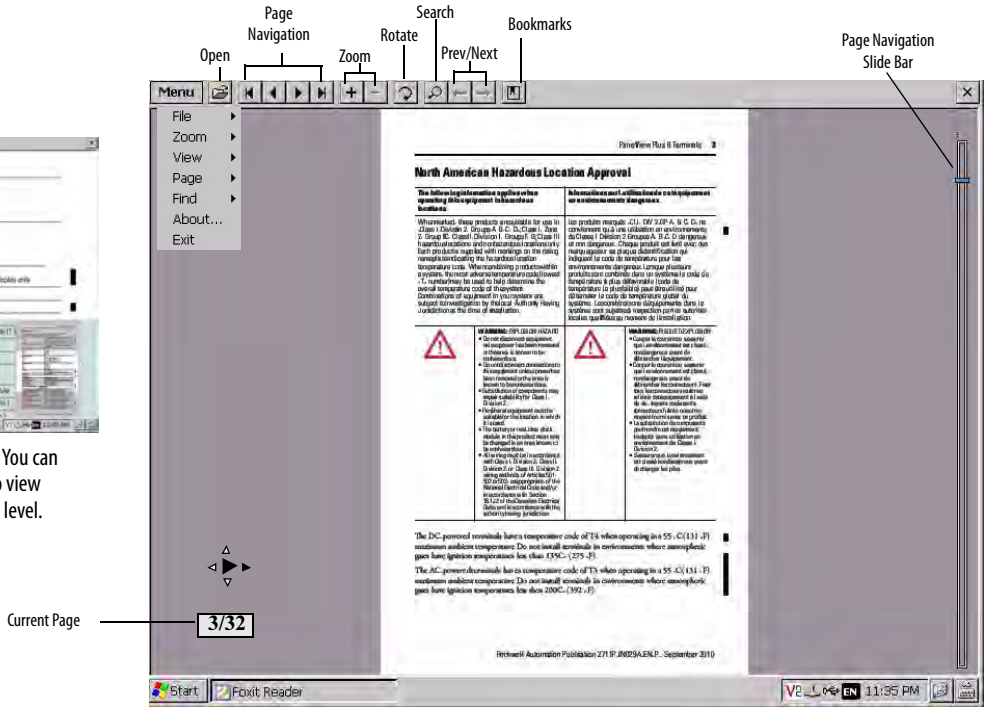
A PDF reader is available on all PanelView Plus 6 terminals and provides typical PDF view and search functions. You can run this reader from the Windows desktop or from a command prompt.

When viewing a PDF document, you can initiate functions from the menu or toolbar. Bookmarks created in the original PDF appear in the Bookmark dialog.

Figure 9 - PDF Reader Workspace



Magnified view of page with minimap. You can touch the gray areas on the minimap to view another area of page at the same zoom level.



TIP If a keyboard is attached, you can use the Page Up and Page Down keys for page navigation. On keypad terminals, hold down the Alt key while pressing the up and down cursor keys.

Some viewing functions can be initiated on touch-screen terminals by touching or dragging.

Table 44 - Touch screen operations

To	Do This	Indicator
Zoom In or Out	Tap the screen once to zoom in. Tap the screen again to zoom out. If Menu>View>Minimap is chosen, a miniview of the page appears in lower right of workspace. You can tap the gray areas to change view.	
Navigate pages	• Drag your stylus or finger to the right or left to view next and previous pages. An indicator shows the direction your are dragging. A box shows the current page/total page count. • Drag up or down the screen to activate the page navigation bar on the right. Move slide bar up or down to navigate pages.	 3/32 See page navigation bar in figure 9.
Rotate	Drag in a circular, clockwise or counterclockwise direction to rotate the page.	

Command Prompt Parameters

You can run the PDF reader from the Windows Command Prompt by entering Start>Programs>Command Prompt and executing the command parameters in Table 45.

Command Prompt Syntax

Foxitreader "file_path/file-name.pdf" *parameter parameter_ value*

- Enter the file path and file name in double quotes and use a forward slash in the file path, and to separate the file path from the file name.
- Use spaces to separate the parameter from the file name and optional parameter value.

Command Prompt Example

Foxitreader "windows/desktop/example.pdf" -p 4

This command prompt opens example.pdf in Foxit Reader at page 4.

Table 45 - Command Prompt Parameters

Parameter	Parameter Function	Example	Description
-p	Go to page	Foxitreader "file_path/file.pdf" -p 2	Opens the PDF file to page 2.
-zw	Fit width	Foxitreader "file_path/file.pdf" -zw	Opens the PDF file and fits the view to the page width.
-zp	Fit page	Foxitreader "file.pdf"-zp	Opens the PDF file and shows the full page.
-z	Zoom to	Foxitreader "file.pdf"-z 150	Opens the PDF file and zooms to 150%.
Multiple parameters	Enter empty spaces between parameters and parameter values	Foxitreader "file_path/file.pdf" -p 2 -zw	Opens the PDF file to page 2 and fits the view the page width
-b	Go to bookmark	Foxitreader "file_path/file.pdf" -b "Bookmark1"	Opens the PDF file to the location specified within Bookmark1
-d	Go to named destination	Foxitreader "file_path/file.pdf" -b "Destination1"	Opens the PDF file to the location specified within Destination 1.
-g	Disable the File>Open command on the Menu and the Open folder button.	Foxitreader "file_path/file.pdf" -g	Opens the PDF file and dims the Menu, File>Open command the Open button.

Image Viewer

Use the Image Viewer to view bmp, jpg, and png images. You can control how are images are viewed to create a slide show. Images can be sorted, rotated, zoomed. You can set the timing between slides and use other transition effects.

To run the image viewer, from the Start menu, choose Programs>File Viewers>Image Viewer>imageviewer.

For help on using the viewer, see the help file in the Image Viewer folder.

Install and Replace Components

ATTENTION: Prevent Electrostatic Discharge

This equipment is sensitive to electrostatic discharge, which can cause internal damage and affect normal operation.

Follow these guidelines when you handle this equipment:

- Touch a grounded object to discharge potential static.
- Wear an approved grounding wriststrap.
- Do not touch connectors or pins on component boards.
- Do not touch circuit components inside the equipment.
- Use a static-safe workstation, if available.
- Store the equipment in appropriate static-safe packaging when not in use.

SHOCK HAZARD: Disconnect all power from the terminal before installing or replacing any components. Failure to disconnect power may result in electrical shock or damage to the terminal.

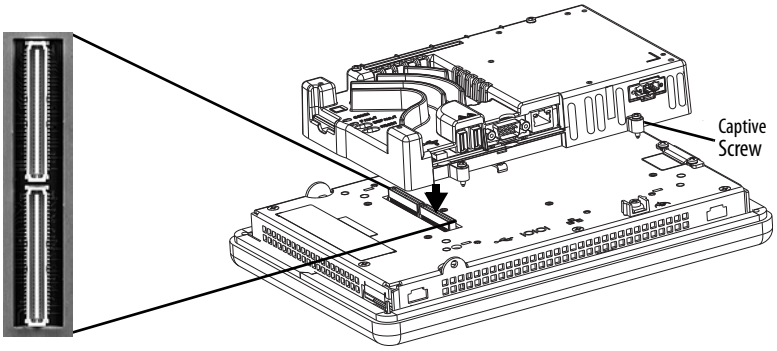
Required Tools

You will need a #1 and #2 Phillips screwdriver to replace components.

Install or Replace the Logic Module

If the display module and logic module are ordered as separate components, attach the logic module to the display module before panel installation.

1. Make sure power is disconnected power from the terminal.
2. Set the display module display-side down on a clean, flat, stable surface.
3. Position the logic over the back of the display module, aligning the logic module connector with the connectors on the display module.



4. Push down on the logic module until it is firmly seated.
5. Tighten the four captive screws that secure the logic module to the display module and torque to 0.58 N•m (5...7 lb•in).

Before replacing a logic module, you must first remove the communication module, if attached.

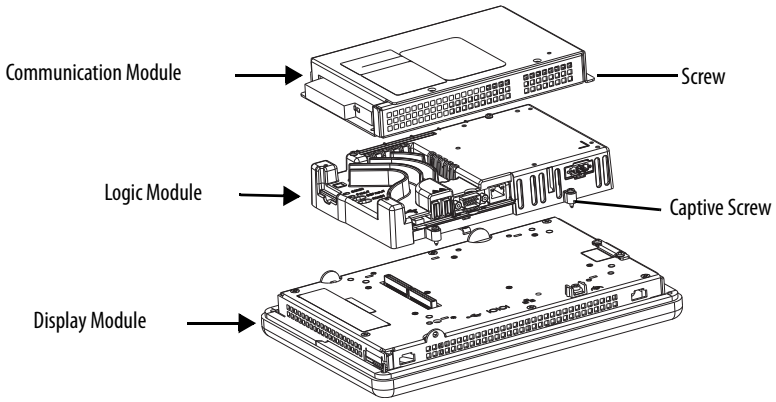
Follow these steps to replace a logic module.

1. Disconnect power from the terminal.
2. Disconnect all power and communication cables.

WARNING: Do not connect or disconnect any communication cable with power applied to this device or any device on a network. An electrical arc could cause an explosion in hazardous location installations. Be sure power is removed or the area is known to be nonhazardous before proceeding.

3. Set the display module display-side down on a clean, flat, stable surface.

4. Remove the four screws that secure the communication module, if attached, to the logic module and set the communication module aside.



5. Loosen the four captive screws that secure the logic module to the display module.
6. Carefully lift the logic module from the back of the display.

ATTENTION: Wear a properly grounded ESD wristband before touching any of the electronic components in the logic module.

7. Install the new logic module and torque the four captive screws to 0.58 N•m (5...7 lb•in)
8. Install, the communication module, if necessary, and torque the four screws to 0.58 N•m (5...7 lb•in).

Install or Replace a Communication Module

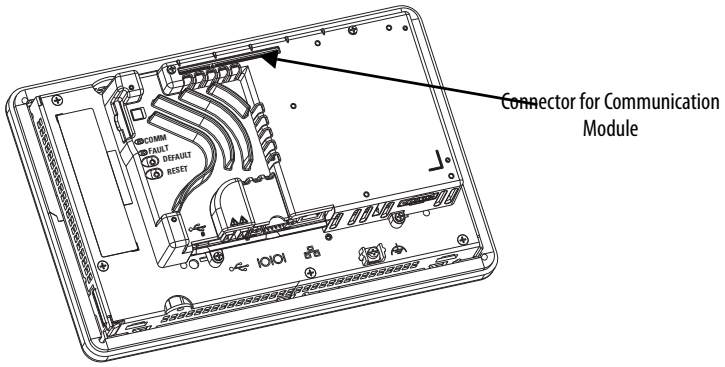
The communication module installs over the logic module. Communication modules are available as separate catalog numbers for field installation.

TIP The logic module must be attached to the display module before you attach the communication module.

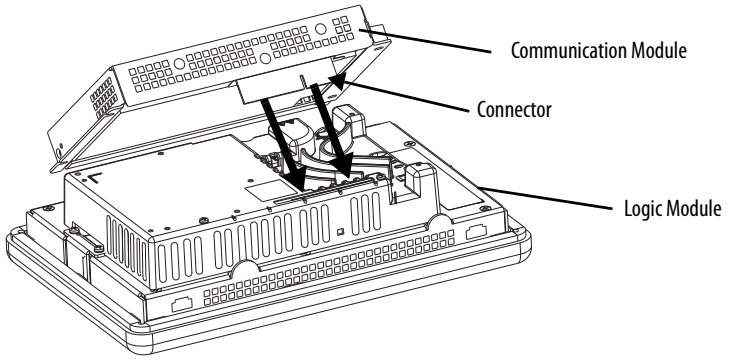
Follow these steps to install a communication module.

1. Disconnect power from the terminal.

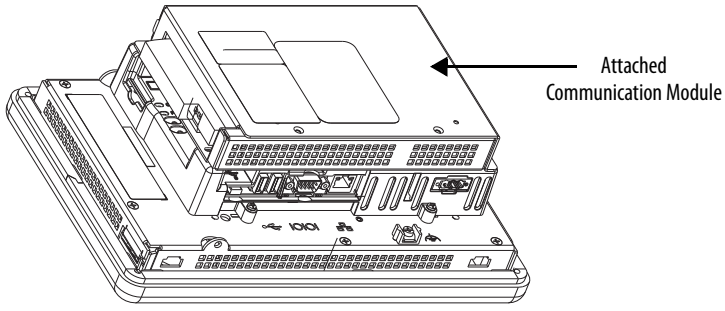
2. If the display module is removed from the panel, set the terminal, display-side down, on a clean, flat, stable surface.



3. Position the communication module over the logic module so that the connector on the bottom of the module aligns with the connector on the logic module.
4. To prevent ESD between the modules, allow the communication module to touch the logic module before making the connection.



5. Push down on the communication module until the connectors are seated.
6. Tighten the four screws that secure the communication module to the logic module to a torque of 0.58 N•m (5...7 lb•in).



Follow these steps to replace a communication module.

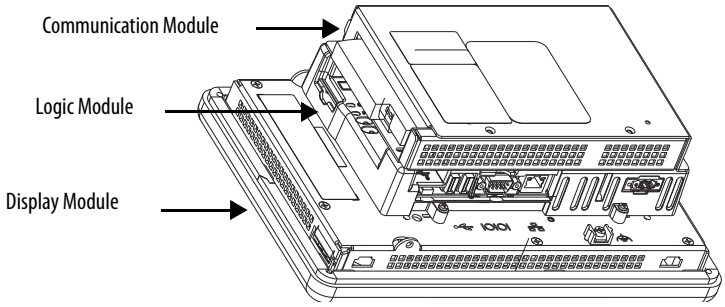
1. Disconnect power from the terminal.
2. Disconnect communication cables from the module.

> **WARNING:** Do not connect or disconnect any communication cable with power applied to this device or any device on a network. An electrical arc could cause an explosion in hazardous location installations. Be sure power is removed or the area is known to be nonhazardous before proceeding.

3. Remove the four screws that secure the communication module.
4. Carefully lift the communication module away from the logic module.
5. Install the new communication module by following steps 4...6 in Install or Replace a Communication Module on page 121.

Replace the Display Module

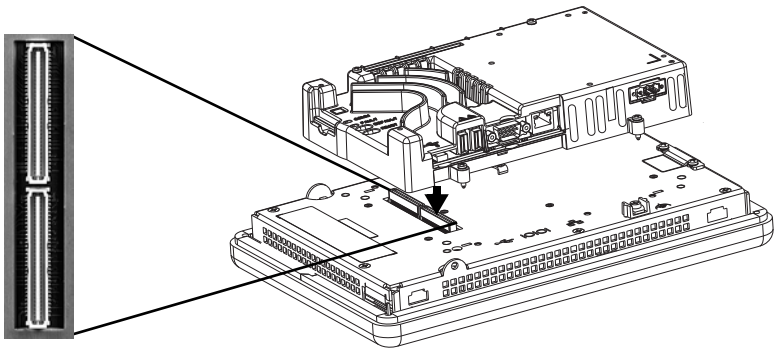
Follow these steps to replace the display module.



Follow these steps to replace the display module.

1. Disconnect power from the terminal.
2. Remove the terminal from the panel.
3. Detach the communication module, if attached, from the logic module by removing the four screws.
4. Loosen the four captive screws that attach the logic module to the display module.
5. Carefully lift the logic module from the display module.
6. Set the display module aside.

7. Position the logic module over the new display module so that the connectors align.



8. Push down on the logic module until firmly seated.
9. Tighten the four captive secures that secure the logic module to the display module and torque to 0.58 N•m (5...7 lb•in).
10. Attach the communication module, if necessary, and torque the four screws to 0.58 N•m (5...7 lb•in).

Replace the Bezel

It is not necessary to remove the logic module or communication module before removing the bezel, except on the 700 terminal.

Remove the Display Module Bezel

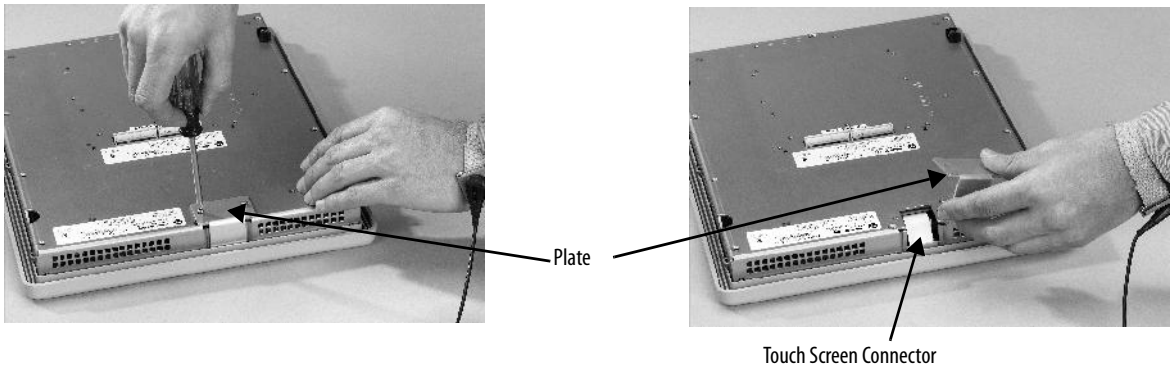
Follow these steps to remove the display module bezel.

1. Disconnect power from the terminal.
2. Set the terminal, display side down, on a flat stable surface.

ATTENTION: Wear a properly grounded ESD wristband before touching any of the electronic components in the logic module.

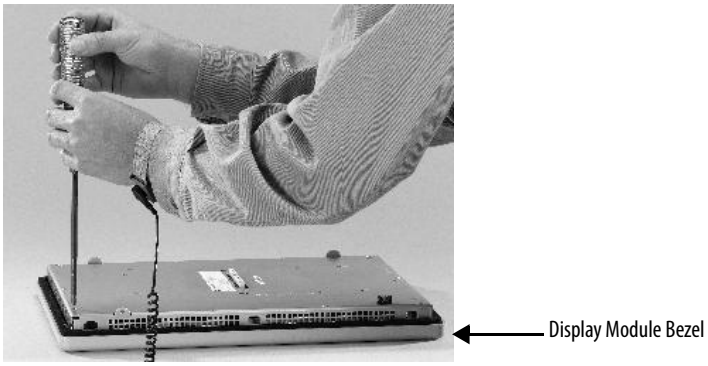
3. On touch-screen only terminals, remove the two screws that secure the small metal plate to the back of the display module.

4. Disconnect the touch screen connector.

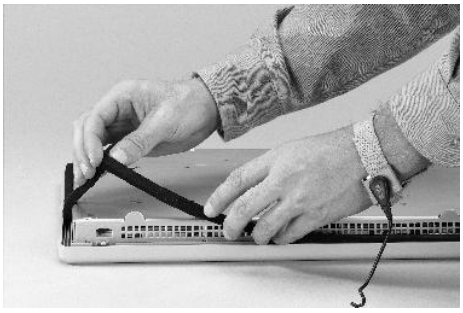


5. Remove the screws from the back of the display module.

   The number of screws varies for each terminal type.



6. Remove the sealing gasket.



7. Lift the back of the display module away from the bezel.

   Work on a clean, flat, stable surface to protect the display from debris, scratches and damage.

8. Detach the connectors.
   - Function key connector
   - Touch screen connector (touch-screen or keypad/touch terminals only)
9. Set the bezel aside.

Replace the Display Module Bezel

Follow these steps to replace the display module bezel.

1. Make sure the bezel is free of lint and marks before attaching.
2. Attach the connectors.
   - Function key connector
   - Touch screen connector (touch-screen or keypad/touch terminals only)
3. Place the back of the display module over the bezel.

   Be careful not to pinch any of the cables. Allow the touch screen connector to extend out of the access opening.
4. Attach the touch screen connector.
5. Replace the sealing gasket.
6. Attach the screws that secure the display module to the bezel and tighten to a torque of 1.35...1.58 N•m (12...14 lb•in).
7. On touch-screen terminals, reattach the small metal plate to the back of the display module and torque the two screws to 0.58 N•m (5...7 lb•in).

Replace the Battery

The terminals have a lithium battery that is used by the real-time clock. It is not used for backup or retention.

ATTENTION: To avoid voiding your product warranty, use only the Rockwell Automation approved battery. Use of another battery may present a risk of fire or explosion.

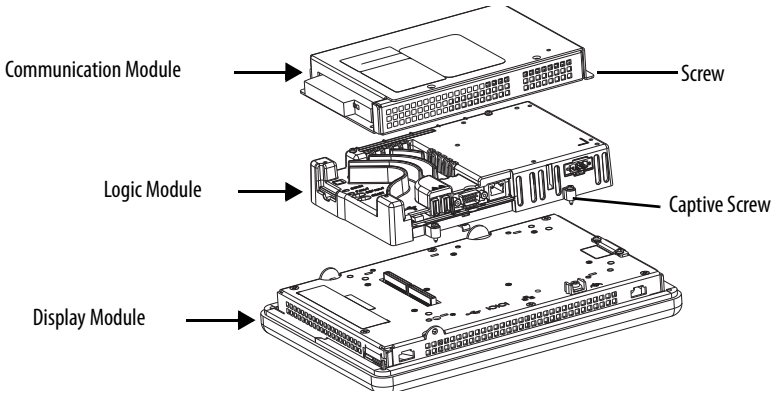
SHOCK HAZARD: Failure to follow proper safety precautions could result in severe electrical shock or damage to the terminal.

WARNING: There is a danger of explosion if the lithium battery or real-time clock module in this product is incorrectly replaced. Replace the battery only with the indicated type. Do not replace the battery or real-time clock module unless power has been removed or the area is known to be nonhazardous.

Do not dispose of the lithium battery or real-time clock module in a fire or incinerator. Dispose of used batteries in accordance with local regulations. For safety information on the handling of lithium batteries, including handling and disposal of leaking batteries, see Guidelines for Handling Lithium Batteries, publication AG 5-4.

Follow these steps to replace the battery.

1. Disconnect power from the terminal.
2. Place the terminal, display side down, on a flat stable surface.
3. Detach the communication module, if attached, from the logic module by removing the four screws.
4. Loosen the four captive screws that attach the logic module to the display module.

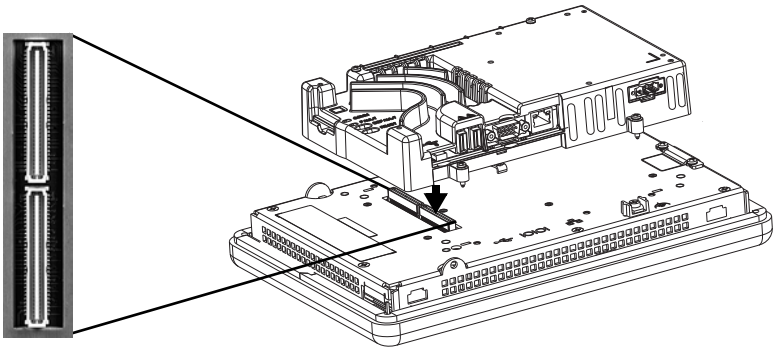


5. Carefully lift the logic module away from the terminal and turn over to expose the circuit board.

6. Locate the battery on the circuit board.
7. Remove the battery by lifting up the side of the battery.
8. Insert the new battery.

IMPORTANT
- Use only replacement battery, catalog number 2711P-RY2032 ,or an equivalent CR2032 lithium coin cell battery.
- The battery may be removed for up to 15 seconds without losing the clock and calendar data.

9. Reattach the logic module by aligning the two connectors on the bottom of the logic module with the connectors on the back of the display module.



10. Push down on the logic module until it is firmly seated.
11. Tighten the four captive screws that secure the logic module to a torque of 0.58 N•m (5...7 lb•in).
12. Reattach the communication module, if necessary, and tighten the four screws to a torque of 0.58 N•m (5...7 lb•in).

This product contains a sealed lithium battery which may need to be replaced during the life of the product.

At the end of its life, the battery contained in this product should be collected separately from any unsorted municipal waste.

The collection and recycling of batteries helps protect the environment and contributes to the conservation of natural resources as valuable materials are recovered.

Replace the Backlight

All of the display modules have replaceable backlights except for the 1250 high-bright displays.

Table 46 - Backlight Replacements

Use Cat. No.	For Display	Series	# of Backlights
2711P-RL7C	700	A and B	1
2711P-RL7C2		C and D	1
2711P-RL10C	1000	A	1
2711P-RL10C2		B and C	1
2711P-RL12C	1250	A and B	2
2711P-RL12C2		C	1
2711P-RL15C	1500	B	2

IMPORTANT Disposal: The backlights for these products contain mercury. Dispose of per applicable laws.

Follow these steps to replace the backlight.

1. Disconnect power from the terminal.
2. Remove the display module bezel.

   IMPORTANT The 700 series C display is not secured by screws and is retained only by a bracket. Use care not to drop the display once the bezel is removed.

3. Remove the four screws that secure the LCD display.

   For 700 displays, remove the four screws that secure the display bracket.